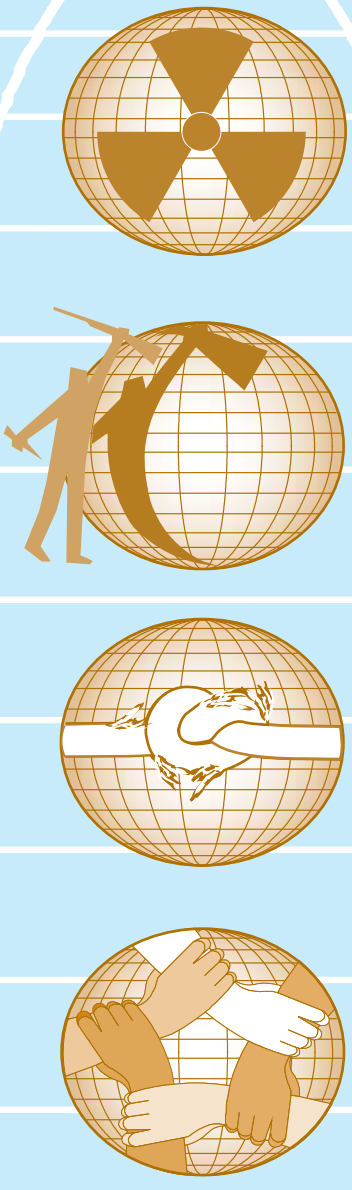
UCRL-ID-149402
CGSR-2002-001

"Whither Deterrence?"

Final Report of the 2001 Futures Project

May 2002



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"Whither Deterrence?"

Final Report of the 2001 Futures Project

May 2002

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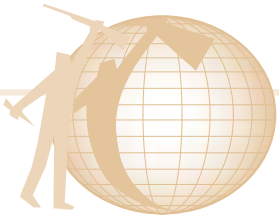

GLOSSARY

ABMT Anti-Ballistic Missile Treaty

ACM Advanced cruise missile

ALCM Air-launched cruise missile

BMD Ballistic Missile Defense

CFE Treaty on Conventional Forces in Europe

CONUS Continental United States

CSIS Center for Strategic and International Studies

CTBT Comprehensive Test Ban Treaty

CTR Cooperative threat reduction

DoD Department of Defense

DOE Department of Energy

D^4A Deter, dissuade, defend, destroy, and assure

DSMAC Digital Scene-Matching Area Correlation

FISS Standard fission nuclear weapon

Foster Panel Panel to Assess the Reliability, Safety, and Security of the United States' Nuclear Stockpile, established by the Fiscal Year 1999 Defense Authorization Act

GPS Global Positioning Satellite

ICBM Inter-continental ballistic missile

INF Intermediate-Range Nuclear Forces treaty

IOC Initial Operational Capability

LLNL Lawrence Livermore National Laboratory

LEP Life Extension Program (missiles)

LTBT Limited Test Ban Treaty of 1963 prohibits nuclear weapons tests "or any other nuclear explosion" in the atmosphere, in outer space, and underwater

MAD Mutually assured destruction

MIRV Multiple, independently targeted reentry vehicle

NIF National Ignition Facility at Lawrence Livermore National Laboratory

NIPP National Institute for Public Policy

NMD National Missile Defense

NMMP DoD's Nuclear Mission Management Plan

NNSA National Nuclear Security Administration

NPT Treaty on the Non-proliferation of Nuclear Weapons

Nuclear Posture Review A Congressionally mandated re-examination of the United States' nuclear policy

Nuclear Test Readiness Program DOE Program

OPEC Organization of Petroleum Exporting Countries (Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, and Venezuela)

Quadrennial Defense Review (QDR) Required by the Military Force Structure Review Act, which was included as part of the National Defense Authorization Act for Fiscal Year 1997. It is conducted every four years as a fundamental and comprehensive examination of America's defense needs.

RRR Reduced-residual-radiation nuclear weapon

Rad Unit of absorbed dose

RV Re-entry vehicle

SAIC Scientific Applications International Corporation

SIOP U.S. Single Integrated Operational Plan

SPA Systems Planning and Analysis, Inc.

SSBN Ship-Submarine-Ballistic-Nuclear

SSN Ship-Submarine-Nuclear

SSP DOE's Stockpile Stewardship Program

START Strategic Arms Reduction Treaty

TER Theoretical enhanced-radiation nuclear weapon

TERCOM Terrain Contour Matching

TLAM/N Tomahawk Land-Attack Missile/Nuclear-armed

TTBT Threshold Test Ban Treaty

WMD Weapons of mass destruction

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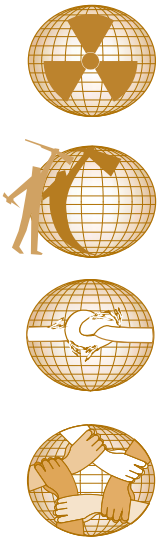
"Whither Deterrence? A Brief Synopsis



The "Whither Deterrence?" study began in April of 2001 to address the question of what deterrence should look like in the future. This section presents a brief synopsis of the study—a longer, more comprehensive report follows.

Introduction

To most audiences, deterrence has been interconnected with nuclear weapons whose purpose had been to deter a Soviet attack. But the Soviet Union has been gone for almost a decade. President George W. Bush has stated that Russia is not an enemy of the United States and the numbers of nuclear weapons can be dramatically reduced.*

It is important to note that deterrence has always transcended nuclear weapons. The United States' first line of deterrence has been its formidable conventional warfare capability, designed to prevent conflict and win wars if necessary. The role of nuclear weapons has been to deter the use of nuclear weapons and other weapons of mass destruction (WMD) against the United States and its interests during the conduct of conventional warfare and to ensure our ability to inflict massive destruction on any who would use nuclear weapons, or other WMD, against us. With regard to the Soviet Union, the threat of the use of nuclear weapons was a critical component of our deterrent to prevent a massive Soviet conventional attack against our allies in Europe.

However, the events of September 11th, 2001 make clear that we have not convinced all who seek to harm us that we will be able to respond in a manner to make them wish they had not even tried. The September 11th attacks, as well as other past conflicts, do not mean that deterrence has failed—it remains effective against the threats for which it was designed. We have known there are other threats for which we did not have a credible deterrent. The challenge is to sustain deterrence against the classic threats as they evolve in technical sophistication while remaining alert to the need to evaluate continuously our ability to deter previously unforeseen challenges. How then should we be looking at deterrence as we consider 15 or so years in the future, say to about 2015? What will be the role of nuclear weapons and other instruments of mass destruction in the future? What should the United States be doing to prepare for the future?

In this study, we present four futures as a tool for planners who must think ahead 15 years or more, rather than a prediction of the future. None of the four futures will emerge in just the way we've described. Fifteen years from now, some mix of these futures is more likely, or perhaps we will see a trend toward one future, but with the possibility that any of the other three could appear, perhaps quite swiftly. Any future will undoubtedly contain its own kind of unpleasant surprises in contrast to the Cold War; the possession of enormous nuclear-response and conventional-response capabilities may not be sufficient to deter these from happening. However, there are other tools that the United States must include as part of its strategy and

* Russia has recently concluded an agreement with the United States for significant strategic arms reductions beyond those of START II and has also entered into an agreement to participate in some NATO activities.

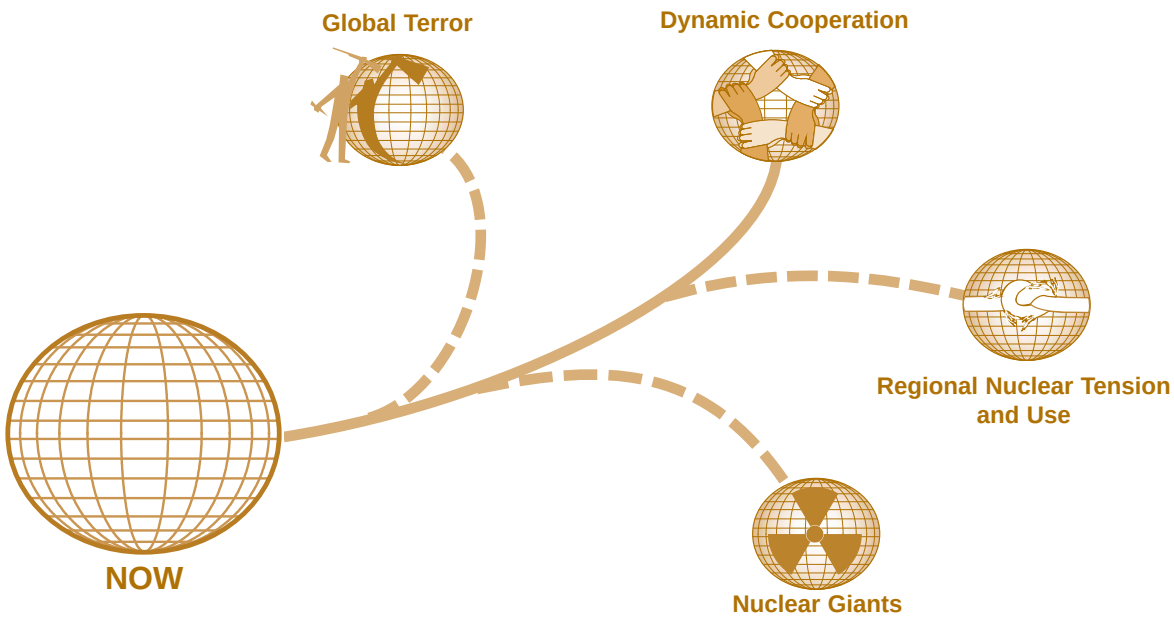


Figure 1. Different future scenarios considered in the "Whither Deterrence?" study.

security policy in addition to deterrence—specifically dissuasion, defense, destruction, and assurance. Rather than rely on the Cold-War concept of deterrence, future security policy should be built upon the appropriate mix of these elements as a way to steer us toward a more favorable future, while ensuring we're prepared for the kinds of surprises associated with far less favorable futures.

In this study, we have defined three unfavorable futures to be avoided, and one future that represents, we believe, a more desirable global situation than the first three, but still not entirely benign. Our security policy should be defined to avoid or prevent the first three, which we have called *Nuclear Giants, Global Terror,* and *Regional Nuclear Tension and Use*, and to steer us toward a more favorable future, *Dynamic Cooperation* (**Figure 1**). We have examined the implications for both policy and military capability that are posed by these different futures. The result often raises more questions than we can answer without additional study—however, our primary purpose was to clarify the issues, to identify what we believe we know, what we don't know, and where more study and effort are needed. Nevertheless, in preparing for unfavorable futures, we must also identify and plan the future we want. This study emphasizes that a desirable future in 2015 is characterized by peaceful resolutions of conflict, growing worldwide economic prosperity, an effective non-proliferation regime, the ability of the United States to control its own destiny without conflict, and expansion of political and economic freedom. Security policies, even in the face of unpleasant futures, should be crafted so as to enhance, rather than diminish, these desired goals.

Four Possible Futures

Nuclear Giants represents an extrapolation from the present, characterized by massive nuclear arsenals and delivery systems. Russia and China will be our dominant opponents with an expectation that they could interact either as allies or adversaries. In this future, Russia seeks to regain global power, while China seeks to attain it, with India at the threshold and moving up. Nuclear stockpiles will be on the order of thousands of warheads, with sophisticated delivery systems. Russia and China will possess chemical and biological weapons. Theater missile defense will be relatively robust and the United States will have a modest national missile defense. Russia and China will sell advanced conventional weapons, ballistic and cruise missiles, and WMD technologies. The United States, the European Union, and Japan will be the dominant economic powers, but China's economy will grow and will eventually become a dominant economic force. Russia's economy will continue to lag those of the major powers.

Global Terror reflects today's headlines, but has persisted until 2015 and has expanded to be a truly global problem. The main source will be militant Islamic fundamentalists, the only terrorist network with global reach. They will be

prepared and capable of using any WMD and will have been successful in overthrowing moderate Islamic governments. The economies of the United States, Europe, and East Asia will have been severely damaged. The U.S. homeland will have been attacked regularly and will be perennially vulnerable—U.S. global influence is waning and alliances are eroding. To deal with this threat, the great powers may pursue unilateral actions or may join together in a grand anti-terror coalition. There is the possibility of a nuclear response by Israel or other serious reactions by the United States or other states.

The third scenario, *Regional Nuclear Tension and Use*, posits a set of possible futures, all of which involve the use or potential use of nuclear weapons in a regional context, but which have the potential for global impact. All may be triggered by regional cultural, religious, and political tensions and are exacerbated by the possession of nuclear weapons and a multiplicity of delivery vehicles. India and Pakistan will be the obvious candidates, but there will be others, such as Iran and Iraq, and perhaps Egypt and Syria, acquiring nuclear weapons. Furthermore, the U.S. pursuit of terrorists in unstable regions could stimulate regional conflict. The fact of a nuclear-armed Israel will certainly continue into the future, and its nuclear capability will stimulate its neighbors to develop WMD and to encourage asymmetric ways to use them. Another scenario has Korea uniting, but possessing nuclear weapons, causing Japan to acquire them with modern delivery systems. Nuclear exchange under these scenarios will become more likely as will the use of other WMD.

We also examined a fourth scenario—*Dynamic Cooperation*—which represents another possible future, but one that is more favorable than those posited before. In this future, democratic political systems and market economies will be on the ascendancy. Although there may be limited low-level conflict throughout the world, there are no global threats and the great powers have established productive relations. The continued globalization of markets and technology will enhance economic productivity and growth and the threat of the proliferation of WMD will have declined. This future is accompanied by an increase in the authority of international institutions over and governance of international crime and commerce. Nuclear weapons are present, but stockpiles will have been reduced and proliferation is largely curtailed. Surprise has not been eliminated.

Policy Issues

For each of the futures outlined above, the United States will have to formulate and execute policies, either to attempt to prevent the consequences of a particular negative future, to steer the nation toward a more favorable future, or to deal with the exigencies of the future that is actually realized.

In a future of *Nuclear Giants*, Russia and China are our dominant opponents. With respect to Russia, we identified three primary issues that should be addressed: the development of a new strategic relationship, the construction of a U.S. hedge posture should the relationship between the United States and Russia sour, and the strengthening of cooperative threat reduction (CTR) activities. While there are substantial unknowns—for example, how Russia will respond to an informal "arms regulation" regime, or the degree to which it would see a U.S. hedge strategy as a threat—we concluded that the overall goal of the United States should be to normalize relations with Russia, recognizing that this will take a long time. As a component of this relationship, we should explore new mechanisms to promote assurance on both sides, some of which may not require formal treaties. The United States should proceed prudently to give substance to a hedge strategy, but should increase transparency with Russia to avoid misunderstanding. CTR should be embedded within the emerging strategic relationship and evolve to become a vehicle of mutual cooperation for security.

Two major issues arise with China: Taiwan's security, which is both a short-term and medium-term issue, and the evolution of the political-military relationship between the United States and China, which is primarily a longer-term issue. Nevertheless, both must be viewed against a backdrop of Chinese economic expansion and growth in defense investment. Given our uncertainties about the direction of our strategic relationship with China, a prudent course of action would be to engage China in a strategic dialogue to deal constructively with trade issues and human rights and to begin to discuss military/strategic issues, perhaps using arms control as a mechanism to initiate the discussion. The United States will need to clarify its own nuclear-policy strategy vis-à-vis China, especially in view of China's modernization and the U.S. deployment of a Ballistic Missile Defense (BMD). A key course of action is for the United States to continue serious diplomatic efforts to avoid conflict over Taiwan, without a fundamental change in the U.S. "One China" policy.

If we were unfortunate enough to find ourselves in a future of *Nuclear Giants*, the United States would have to adopt a nuclear

Nuclear Weapons (WMD) in current conflict

1.	Afghanistan	– fighting terrorists in nuclear environment
2.	Pakistan	– ally's nuclear weapons at risk
3.	Russia	– leakage
4.	Iraq	– use
5.	Israel	– provocation
6.	Terrorists	– attack on allies, forces, CONUS

Figure 2. Six ways in which nuclear weapons (or other WMD) could have affected the anti-Taliban conflict in Afganistan.

posture in keeping with the threat and with a nuclear arsenal and supporting infrastructure sufficiently robust to deter nuclear attack from any of the nuclear-armed adversaries. There would also need to be appropriate alliances, both to support U.S. interests and to extend deterrence to those who may be under threat in this kind of future.

With respect to a future dominated by *Global Terror*, two major issues are whether or not terrorists can be deterred and how to deal with the sources of terrorism. While we know that traditional deterrence will not prevent terrorist attacks, retaliatory actions against nations, as exemplified by the present coalition with the anti-Taliban forces in Afghanistan, may deter some supporters of terrorism. We stress that better intelligence is critical. Enhanced understanding of terrorists' tactics can bolster defense against attacks, thereby denying their objectives, but it is impossible to cover all contingencies. We need to understand if there is a form of retaliation that would deter, depending on understanding those things that terrorists value, given that some have demonstrated the lack of valuing their own lives. Denial of comfort or of reward to their families is an example. Additionally, since September 11th, the specter of nuclear weapons has been raised in six different contexts (**Figure 2**). Similar contexts will be present in the future and the United States must understand how it would respond to the use of WMD by terrorists and what its declaratory policy should be.

There is much we need to understand about the sources of terrorism—there are gaps in our knowledge of the motivations, tactics, resources, and bases of potential adversaries. There is a persistent lack of integration of information such that national resources are not being fully utilized, and severe legal constraints still remain. We should begin with strengthening the human intelligence resources of the intelligence community and maintaining intelligence partnerships with other states. This should be coupled with maintaining and developing alliances in regions of concern, especially to discourage the further proliferation of WMD. Humanitarian aid can be enlisted to dissuade and demotivate terrorists and their supporters; programs should be developed to address root causes of conflicts, such as new approaches to facilitate indigenous economic and political development.

An important conclusion of the study is that requirements for deterrence (and for dissuasion, defense, destruction, and assurance) will differ for each country and situation. What we learned during the Cold War will not be applicable in wholly new situations. Each country requires detailed analysis, and such analysis needs to be shaped to inform real-world planning. This sort of assessment is not being done in an organized, comprehensive way. We suggest a new entity to develop such assessments and help apply them to deterrence (and other relevant) planning.

In a future dominated by *Regional Nuclear Tension and Use,* we have identified the key issues to be deterring the use of WMD in regional conflicts, determining the role of the United States in such conflicts, and understanding the role of nuclear weapons. While we know countries are involved in regional conflict that have WMD capability, that chemical weapons have already been used, and that proliferation has occurred, we don't know what role the United States might choose to play in deterring conflict and whether the use of WMD can be deterred. There are many gaps in our knowledge of potential adversaries and a lack of understanding of the roots of conflict and how to deal with them. Whether or not U.S. possession of more discriminate nuclear weapons would strengthen deterrence or increase the likelihood of use needs additional study.

The United States must be prepared to assure its allies such as Japan, South Korea, and Israel of its intention to support and assist them. It must be prepared to engage in diplomatic activities up front, before the onset of crises and especially during the early stages of a crisis. It must continue to dissuade countries such as Iran and North Korea from acquiring WMD, and it must dissuade countries

such as India and Pakistan from using WMD. The United States must develop a clear view of how to go about deterring the use of WMD in specific cases, especially during conflict escalation. In addition, the United States must be prepared to defend against the use of WMD, not only through BMD, but also by strengthening its passive defenses. Finally, the United States must be prepared to destroy any military capabilities that threaten its allies.

It would be desirable for the United States to adopt policies to steer it away from the potential futures just described and toward a less threatening future. However, even in a world of *Dynamic Cooperation*, elements of each of the preceding futures may be present, although to a lesser degree. This implies that some of the policy issues identified above may also be relevant, with appropriate modification. A case in point refers to nuclear-weapon policy. The main concern this scenario raises is that of maintaining the necessary infrastructure, resources, and operational capability to respond effectively when the inevitable surprise occurs. It is always difficult to argue, during times of relative peace, for military hardware, forces, and bases, and the tendency is to relax one's guard. This is a particular problem for nuclear weapons and their infrastructure. A particular issue is maintaining the expertise to deal with potential stockpile problems or to respond to new requirements, should the global situation take a turn for the worse.

For all the future scenarios and the courses of action we have outlined, the following missions for nuclear weapons in 2015 were identified in one form or the other:

- to deter an attributable nuclear attack on the continental United States;
- to deter attributable WMD use on the U.S. and its allies;
- to deter large-scale conventional attacks;
- to respond to a massive nuclear attack; and,
- to destroy unique targets.

Given these potential needs, our policy conclusions with respect to nuclear weapons are—

First of all, the Administration needs to issue a strong and clear statement outlining the importance of nuclear weapons to the security of the United States. This must be accompanied by appropriate supporting actions that reinforce its stated position and that are tied explicitly to U.S. nonproliferation objectives.

Secondly, the United States must maintain its nuclear capability base, both in the areas of design, production, and testing, and in human resources and skills. This is particularly critical if we are to maintain a realistic hedge.

Thirdly, the United States must fully examine the impact of strategic reductions with Russia on other relationships, for example, with our allies, with China, and with respect to regional deterrence.

Lastly, the United States needs to come to grips with the question of modernizing its nuclear warheads and delivery systems. Our study uncovered serious concerns requiring additional review and study. The issue of modernization will be considered in more detail below.

Weapons and Operations

Our study concluded with an examination of the roles and requirements of weapons, operations, and infrastructure in meeting a future characterized by changing threats and surprises. Time and commitment will be required to maintain weapons-system infrastructure, to create systems that are responsive to the threats, and to ensure operational readiness. Whatever is done must be robust and flexible—robust in response to an uncertain future and flexible in response to changing threats and policies.

We found that, in 2015, deterrence will depend on nuclear and nonnuclear offensive capabilities and active and passive defenses. It is our view that precision conventional weapons by themselves cannot deter the use of WMD and that BMD at that time will not be sufficiently developed or capable to diminish the need for offensive forces. Therefore, nuclear weapons must be seen as credible and operationally ready for massive use and, in some circumstances, for limited application. Thus, our allies and our potential adversaries must see the infrastructures of both the Department of Defense (DoD) and the Department of Energy (DOE) as robust and capable of responding to new threats.

Our study, however, uncovered serious issues relative to our weapons and delivery systems and their capabilities in 2015. Very little modernization of delivery platforms is planned over the next 15 years. What we will have in 2015 will essentially be what we have today. This raises questions about the continued credibility of our nuclear deterrent, and it could raise difficulties in providing a base of planning for the years after 2015.

Another issue involves the warheads that go along with these aging platforms. Unless there are some dramatic new developments in warhead modernization, the warheads on these systems in 2015 will be the same warheads we have today. Many of these warheads are already 20–25 years old, and they will only age further by 2015, unless the planned Life Extension Programs (LEPs) are successful. This is contrasted with the past when a new warhead system was deployed on the average every seven years.

The DoD is not looking at future nuclear weapon needs, and its Nuclear Mission Management Plan (NMMP) does not address preservation of reconstitution assets. Although the NMMP identifies unique technologies that must be preserved, the funding is not assured. In addition, the DOE's Stockpile Stewardship Program (SSP) identifies capabilities needed for a robust infrastructure, but it suffers from a number of planning and funding deficiencies, including continued decline of production plants, slipping LEPs, questionable ability to respond to new requirements, and inadequate DoD support.

Our study explored four elements we believe to be critical for ensuring robustness and flexibility for responding to future threats: (1) improved non-nuclear capabilities, (2) hedging for uncertainty, (3) new nuclear-weapon capabilities, and (4) dual-capable weapon systems. We found that non-nuclear capabilities are modernizing across a broad front with an important emphasis on the melding among technology, communication, and intelligence. In spite of the great strides being made, we were disturbed to find that these new systems had no nuclear-survivability requirement. Given that nuclear threats still exist and will likely exist in the future, we find this to be a serious concern.

Hedging for uncertainty, especially with respect to nuclear forces, has been a persistent theme of our study. While attractive in principle, what is missing is a realistic plan that includes reasonable estimates of timelines and costs. It is critical that such a plan provide guidance for specific actions to improve DoD and DOE infrastructures, but also seek efficiencies, for example with a smaller, but revitalized, DOE production complex. Details for reconstituting existing capabilities need to be worked out and careful thought needs to be directed toward how to preserve existing assets, such as warheads and systems, in order to respond in the near term. For the longer term, the plan must address how to reestablish capability through new nuclear-weapon systems, as old hardware can no longer be relied upon. A particular challenge is to retain competence through people, technology, and facilities. For a hedge plan to be credible, it must include the training necessary to maintain nuclear-mission operational readiness.

A difficult issue that needs more attention and study is the role that new nuclear-weapon capabilities can play. This study examined how new nuclear-weapon design options can reduce collateral damage and enhance deterrence. However, exploratory development is needed to assess potential options in specific scenarios of interest. Although there are ongoing studies for hard and deeply buried targets, few other potential needs are being given serious examination. In fact, some studies of new designs are actually prohibited by law.* The kind of studies that could be conducted include warheads that would completely destroy biological-weapon agents rather than simply dispersing them, weapon technology to reduce collateral damage and fallout, improvements in delivery accuracy that would permit reductions in yield, and warheads for BMD to provide high-confidence kills of incoming warheads. The existence of such studies would help dispel impressions that the United States would be self-deterred from a nuclear-weapons response to WMD attacks. Such studies would contribute greatly to the maintenance of knowledge and expertise. Current law prohibits the National Nuclear Security Administration (NNSA) from initiating new weapons-development programs or new warhead-refurbishment programs that have not been formally identified to and approved by the Congress.

Central to the issue of ensuring robustness and flexibility in order to respond to future threats is the issue of modernizing U.S. nuclear forces. This goes beyond the exploratory development mentioned above and speaks to the issue of the stockpile of the future and its associated delivery systems. A case can be made that because our nuclear forces are aging and delivery systems are reaching their end of life in the 2015 timeframe, modernization is required to maintain a credible deterrence posture and to sustain

* The Conference Report (H. Rept. 107-258) on H.R. 2311, Energy and Water Development Act, 2002, states "The National Nuclear Security Administration (NNSA) may not use funds in fiscal year 2002 to initiate new weapons development programs that have not been formally identified to and approved by the Congress, other than through formal written reprogramming requests to the Armed Services and Appropriation Committees of Congress."

the infrastructure and knowledge base needed to support this posture. On the other hand, certain new designs would undoubtedly require nuclear testing, and without clear strategic military requirements, the political barrier would be impossible to overcome. Our study raises this issue as a topic needing substantially more study and discussion, especially the limitations imposed because of no nuclear testing.

Finally, dual-capable systems offer the possibility of low-cost, state-of-the-art nuclear capabilities. Such systems can reduce the development time and cost associated with nuclear systems because their primary requirement would be nonnuclear. Training and operations could be made minimally different. The operating and maintenance burden for nuclear weapons would also be reduced. Nevertheless, significant challenges stand in the way of taking advantage of this possibility, not the least of which is overcoming the military's present phobia about nuclear weapons. Other challenges include reliability, safety and security, and weapons and system control.

Summary

Our study has concluded that the future is and will be highly uncertain. A key element in planning a deterrent posture for the future is to recognize this uncertainty and the potential for difficult and dangerous scenarios. We have found that the Cold War approach no longer works and that the security policy of the United States must be broadened to include elements of dissuasion, defense, destruction, and assurance. However, there is no "one size fits all" approach, and the policy mix must be tailored to the individual situation. It is likely that the United States' superiority in conventional and nuclear forces will not be challenged directly. Instead, we may be faced with a world in which the specter of clandestine, asymmetric warfare is dominant.

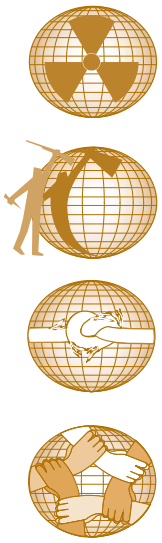
Nevertheless, all of the futures examined reveal a continued role for nuclear weapons. The modernization of nuclear weapons and their delivery systems are key issues, but there was no consensus for a strategic requirement for modernization, although thoughtful arguments were presented on both sides. Arguments were offered for new kinds of nuclear capabilities that might be needed to deter the range of threats in future world scenarios, but what could or could not be accomplished without nuclear testing remains uncertain. Our study raises concerns about U.S. policy with respect to modernization and proposes additional effort to better understand the benefits and downsides. In general, there was broad consensus on the need to maintain a viable infrastructure and the importance of maintaining the nuclear skill base through new programs.

We concluded the project with a roundtable discussion of the findings and conclusions in which senior members of the international security community expressed their views on the issues covered. From this discussion, many of the points presented were validated, some were questioned, and a number of new issues were uncovered. These included questions about BMD and its potential effectiveness and relation to deterrence and arms buildup, doing a better job of taking into account the needs of other countries, especially our North Atlantic Treaty Alliance (NATO) allies, addressing how to work toward the future that would be most desirable, being clear about what the U.S. response should be to WMD use, whether pursuing new design weapons (particularly lower-yield weapons) would lower the nuclear threshold or encourage other states to do the same, and the role and potential transformation of arms control agreements.

A key issue was what would be required to deter terrorists, especially without creating adverse effects in other areas, such as exacerbating regional conflicts. It was concluded that it is probably impossible to deter individual terrorists and that our best approach is a combination of actions: deterring states that sponsor terrorism, a robust defense against terrorist incidents, and finding ways to delegitimize terrorists in their own communities.

There was also discussion on a number of other points: for example, the need to take more seriously the likelihood of future conflict between Israel and Muslim states and the asymmetric nature of that conflict, and the advisability of the United States establishing and communicating policy "red lines," i.e., what actions by others we would not be willing to tolerate and what our response might be. Some pitfalls to be avoided were discussed: the commitment trap, whereby in the interest of enhancing deterrence, we increase the likelihood of nuclear-weapon use; the unintended chain reaction, whereby U.S. action, such as establishing BMD, encourages a series of military buildups by other states; and the potential for catalytic war, where actions by a third state are intended to cause war between two other states. Many of these new issues merit additional study—they will be presented and discussed in the following complete report.

"Whither Deterrence?
Final Report of the 2001 Futures Project



Introduction

The Center for Global Security Research (CGSR) at the Lawrence Livermore National Laboratory (LLNL) brings together experts from the science and technology and policy communities to explore innovative ways in which science and technology can enhance national security. One of the tools the Center uses is a "futures project," an interactive forum that brings together experts from inside and outside the Laboratory to look 15–20 years into the future at significant national security issues ripe for new consideration. These projects typically last for 8–9 months and consist of a series of exploratory workshops. A two-day conference concludes the project. On the final day of the conference, a panel of senior officials and experts, chaired by a distinguished national leader, reviews the project's findings and conclusions. Past futures projects have included "Beyond Moore's Law" in 1999, which examined the national security implications of ubiquitous supercomputing and networks, and "After Globalization" in 2000, which explored the spread of state-of-the-art military technology worldwide.

The primary purpose of a futures project is to generate important insights about the topic under consideration, to understand what we know about it, what we don't know, and what we need to find out. The idea is to seek clarity, not consensus. A lack of consensus often indicates that additional study, analysis, and discussion are required. The issues identified, the findings uncovered, and the conclusions presented are those of the participants. They are not attributed so to keep the discussion as open and frank as possible.

Participants are invited from academia, government, the military, think tanks, the national laboratories, research centers, and the business community. There is a conscious attempt to balance the political spectrum. A diversity of views is encouraged. It is important to point out that the *process* of the project—that is, the interactive workshops, allowing cross-fertilization of ideas and involving a hundred or more individuals—is perhaps more important than *the product*, this report. Findings of the project and the views of the participants are presented, but this is not a research paper with references and footnotes.

In 2001, the Center's futures project, "Whither Deterrence?" examined how deterrence has to change from its Cold-War posture to address the challenges of the 21st century. In our approach, we projected ourselves 15 to 20 years into the future and asked hard questions about the role of nuclear weapons, the emergence of new nuclear powers and the threat of other weapons of mass destruction (WMD), the formation of new alliances, the implications of defenses, the potential for widespread terrorism, and the possibility of regional nuclear conflict. These and many other questions were raised during the course of the project as we sought to understand and clarify how deterrence would have to be structured to deal with an uncertain and potentially dangerous world.

We organized into three working groups:

- Threats, Scenarios, and Transforming Events
- Policy and Diplomacy
- Weapons, Operations, and Infrastructure.

An individual with significant expertise in the subject and with a history of high-level government service chaired each group. Project participants self-selected the group in which they participated, but the number of participants was essentially the same for each group. The workshops included not only separate working-group meetings, in which the experts went into the details of their subjects, but also plenary sessions, in which the chairs summarized the results to date to the entire body and in which cross-cutting issues were discussed. From time to time, experts in a particular subject were brought in to brief on specific topics, and a number of small panels were convened to explore particular timely issues, such as Ballistic Missile Defense (BMD) and relations with China. In all, more than 130 individuals participated in the "Whither Deterrence?" project.

The dates and locations of the workshops and other events for the 2001 project were—

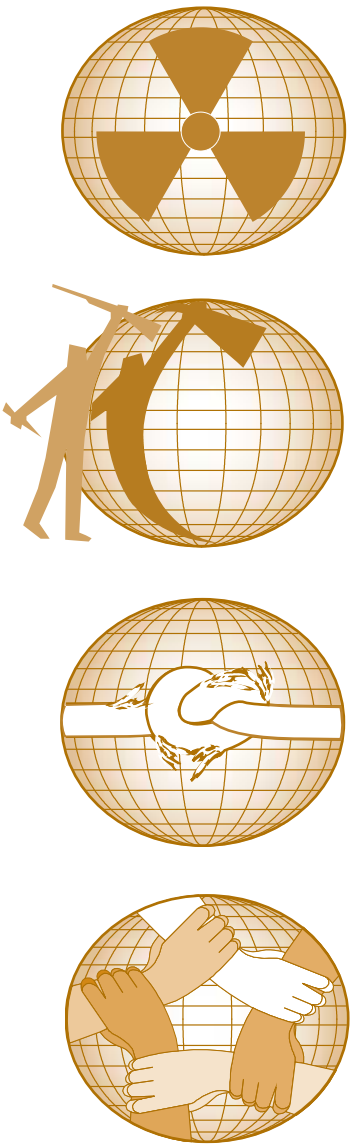
- March 23, Livermore, CA—dry run at LLNL
- May 1–2, Washington, D.C.—first workshop
- June 14–15, Livermore, CA—second workshop
- August 3, Livermore, CA—ballistic missile defense experts' roundtable
- September 19, Washington, D.C.—China experts' meeting
- September 20–21, Washington, D.C.—third workshop
- November 29, Livermore, CA—final conference
- November 30, Livermore, CA—senior review panel.

Typically, 40–50 people attended the workshops, with 75 attending the final conference. Thirty individuals participated in at least three of the four workshops/conference. Hence, there was both a "core" that participated throughout the project and new participants who introduced fresh ideas along the way.

This final report presents the issues, findings, and conclusions of the "Whither Deterrence?" project. It attempts to present the views of the participants and is not intended to represent the views of the Center, the Laboratory, or the University of California in any way. The Center is grateful to all those who participated for their time and effort and for their important insights into the future.

Chapter 1
Report of the Threats, Scenarios, and Transforming Events Working Group

Michael Nacht, Chair



Surprises

From an American perspective, we continue to be surprised throughout our history. What is prepared for does not come as a surprise; it is a tautology that what we are not prepared for is what surprises us. And yet, we must anticipate and try to control foreseeable international instabilities, as was done relatively successfully during the Cold War. Indeed, policy-making is about prediction: we adopt policies expecting that they will produce certain desired results. Yet, the history of the American national-security experience is replete with major surprises that completely altered the international landscape.

Two years into World War I, President Woodrow Wilson still denied the role that the United States would play in this conflict, and we were not prepared for what we would take on just a year later. Pearl Harbor was an enormous tactical surprise; we had been preparing for sea warfare with the Japanese for two decades, but were unwary and unprepared for the air attack. Secretary of State Dean Acheson declared in 1950 that Korea was outside our defense perimeter; this proclamation probably encouraged the North Korean attack on South Korea six months later to which the United States immediately responded, even though many in Washington thought the attack was a communist feint prior to a major Soviet attack in Europe. Sputnik, the collapse of the Soviet Union, the Iraqi invasion of Kuwait, and the September 11th attacks are examples from a broad spectrum of surprises. Inter-war surprise attack, statements by our leaders that encouraged aggression, international reorganization, and a non-state actor (Osama bin Laden) engaged in a very successful strategic attack all demonstrate the wide variation we must expect in events that transform our national security context.

The implication of recurrent surprise is that planners and policy-makers should avoid point predictions in thinking about the future and instead work with projected geopolitical contexts and multiple-conflict scenarios in establishing the needs for security policies and forces.

Context-Based Methodology

As we turn to plausible futures for the 2015–2020 time frame, for which policies and weapons should be prepared, it is unwise to focus on one most likely future—none of us is clairvoyant—but rather, we should develop a set of contexts from which a variety of scenarios could emerge. To this end we asked what are the axes of conflict and competition dominant from an American point of view during that time frame? From 1947 until 1991, there were a variety of conflicts, but clearly the Cold War was the dominant axis of conflict and competition. What could be the comparable axis or axes in 2015? We suggest four possibilities: *Nuclear Giants*, *Global Terror*, *Regional Nuclear Tensions and Use*, and *Dynamic Cooperation*.

Note that there could be combinations of these worlds: a mix of global terror and nuclear giants, or of global terror, nuclear giants, and regional nuclear tensions. Clearly, a nuclear conflagration would leave the world so weakened that all pathologies would be present. In addition, these worlds are interactive even if they are not combined. For example, before September 11th, China—as a prospective nuclear giant—was viewed as the

most likely axis of conflict and competition. The sudden rise of the specter of global terrorism has had a profound effect on this perception. Clearly, there are trade-offs both across and among future worlds, making projections all the more challenging.

The array of our principal ideas concerning future worlds is summarized in the matrix in **Table 1-1.** It should be noted that the entries in this table were selected from the variety of ideas spawned from our study and that the full spectrum of possibilities is obviously significantly broader than what is captured here. In addition, these worlds were viewed through the prism of deterrence in which nuclear weapons do matter. There are clearly a lot of other worlds in which nuclear weapons don't play a role; but, to reiterate, the intention of this study is to examine the nuclear-weapon aspects of future global-stability strategies.

We are looking at 2015, in which competing nuclear giants, global terrorists, regional combatants, and cooperating nations are the players on the world stage—whose actions might combine to create the context of that time. For each of these futures, we focused on a half-dozen characteristics, among the many that we might have discussed, which would be important to think about in any of these worlds, and which serve to define the context for planning international security policy and weapon systems.

Nuclear Giants

In the Nuclear Giants future, we posit a more complex nuclear competition than the Cold War, with the United States, Russia, and China forming the principal triangular relationship, but with India an aspiring player in this game. In this world, it is envisaged that these four nuclear-weapon states, the European Union, and Japan will all aspire to global economic influence and some degree of regional dominance. While the

	Nuclear Giants	Global Terror	Regional Tensions	Dynamic Cooperation
Central axis of conflict	Triangular competition	Militant Islamic fundamentalists	Multiple	Non-military competition and cooperation
Players	United States–Russia–China + India	Radical Islam vs. Grand Coalition or Unilateralists	India–Pakistan Israel–Arab countries China–Taiwan Korea–Japan	End of History
Nuclear Weapons	Thousands + delivery	Deliverable capability	Tens to thousands + delivery	Reduced stockpiles
Chem–Bio Weapons	Russian + Chinese	Major capability	Military-scale	Limited
Missile Defense	Theater Missile Defense + some U.S. Nuclear Missile Defense	Theater Missile Defense + some U.S. Nuclear Missile Defense	Theater Missile Defense + some U.S. Nuclear Missile Defense	Theater Missile Defense + some U.S. Nuclear Missile Defense
Information Warfare	Full-court press	Defense against disruption	Offensive, control	Financial defense
Deterrence Role	Back to the "good old days"	Non-states: no? States: yes	Regionally dependent	Replaced by mutual assurance
Nuclear Weapon Implications	Full-employment posture	Aging + new low-yield weapons	Aging + range of options	Aging stockpile
Economic Context	U.S.-European Union-Japan dominate; China rises; Russia lags	Deep recession; deprivation	Volatile	Stable, growing

X1538_Table 1-1

Table 1-1. Principal characteristics of four potential future worlds.

ideological conflicts of the past 60 years are minimal, there are clear overlaps of and tension between these countries' visions for their future world roles.

In this future scenario, in spite of the discussions between Bush and Putin and hopefully with the Chinese, these three nations possess thousands of nuclear weapons and a multiplicity of delivery systems. The number and technological sophistication of these systems have changed, but the assumption here is that we are not in any way moving toward a minimization or the elimination of these weapons. Theater missile defenses in significant numbers and some U.S. national missile defenses exist by then.

Information warfare is characterized as a "full court press," meaning that each of these key players has extensive offensive and defensive information-warfare programs and capabilities. Information warfare itself is now a central element of national security policy; we want to protect ourselves while being able to disrupt the others.

Deterrence as such looks very familiar, not changed very much—now triangular, but a variation of "the good old days." There is a kind of warm fuzzy feeling about it. For inter-war deterrence, we can revisit the writings of Herman Kahn and Thomas Schelling, and with some modification, everything seems still very applicable. We call the implication for nuclear capabilities "full-employment posture." For both weapons and weapons experts, everything is booming. The nuclear weapon is very salient in this world, as in the Cold War, but more complex.

The economy of this era does not look that different from the world we have been familiar with for quite some time; namely, that the global economy remains dominated by a European–American–Japanese triumvirate. China is continuing to rise, but is still not among the leadership; and Russia is still lagging.

This is just one set of characteristics for the nuclear giants in 2015. In some ways, the world where large nuclear forces dominate is the least ambitious, the least interesting, but maybe the most plausible.

Global Terror

Is it plausible to ascribe global terror to the militant Islamic fundamentalist movement? Aren't a wide variety of groups willing to use force indiscriminately against civilians to achieve political goals? Won't they likely increase by 2015? Aren't they all over the world from Ireland to South America to Southeast Asia as well as the Middle East and the Michigan Militia? The answer is, yes. Why then is militant Islamic fundamentalism seen as the dominant axis of conflict for global terrorism?

First, because their global population base of 1.2 billion is spread across 70 to 80 countries worldwide, including virtually all of the great powers—the United States, Russia, China, Britain, France, and Germany, excepting Japan. This is not true of the Basques, the militant wing of the Irish Republican Army, or the Tupamaros in Peru, for example.

Second, they have an unrelenting animosity not only to the United States, but also to modernity itself. There is a Luddite quality here, an abhorrence of the way the world has evolved since 1200 C.E., preventing Islam, in their minds, from becoming the supreme religious view and way of life that it was up until 1200 C.E. Given all of these characteristics, we assert that it will be militant Islamic fundamentalists who will perpetrate global terror and become the central axis of conflict that we have to deal with in 2015.

In this future scenario, the Muslim militant fundamentalists have had a lot of time to acquire sophisticated capabilities; they have demonstrated interest in weapons of mass destruction (WMD) and have moved in this direction. When this movement is coupled with the global spread of technology and the likely proliferation of WMD, this world would be dominated by terrorist threats and plausible use of nuclear, radiation, biological, and chemical weapons.

While we might hope that nations have banded together in a grand anti-terrorist coalition, and we bury—at least temporarily—all our internal problems and inherent competitive instincts, it is also quite possible that the grand coalition against terrorism does not last, and that we are faced with a whole set of unilateralist steps, such as what might occur if Iraq were to provoke the United States into actions not sanctioned by the coalition. Certainly, by 2015, it is possible that each of the major states will go its own way. And we could have no allies against terrorism, with each state having its own homeland defense, its own security policy, and its own deals with adversaries and friends.

Our assumptions are that by 2015 the terrorists have a deliverable nuclear capability, that they have a major chemical–biological capability and an eagerness to use it, that we have theater missile defense and some national missile defense (neither of which apply against the terrorist threats), and

that the main objective of the United States in information warfare is defensive, against disruptive attacks by the terrorists.

Deterrence is far less central in this world, as is argued currently by the Secretary of Defense. Such terrorist attacks cannot be deterred, especially those carried out by suicide "martyrs." Instead, we have to defend yourself, deny resources to the terrorists, and work hard to destroy them. This is the prevalent view. We discussed the option of penalizing the families of known martyrs or of martyrs in advance of their martyrdom, because it is evident that the martyrs value their families greatly and go to their deaths believing that their families will be rewarded for their actions. The *a priori* threat to or denial of benefits to their families holds some prospect of altering the behavior of at least some would-be martyrs.

Deterring the martyrs and the bin Ladens might not be a helpful concept, but deterring their state supporters clearly remains relevant. Qadhafi or Hussein or their successors, the leaders of radical governments that have a lot to lose, are deterrable in ways that the free-floating, non-state actor is not.

We posit that, in this future, there will not be strong domestic support for the modernization of U.S. nuclear forces. They will age without replacement, and while there may be some new low-yield weapons introduced into the arsenal, in general this is not where the military leadership will want to invest its money or manpower. Nuclear weapons as a field of defense policy would seem like yesterday's news.

In this world, Americans live more like the Israelis of today, often and seemingly randomly attacked and perennially vulnerable. Every day, without the hope of relief, there is a sense of vulnerability. Buses and cafés are blown up. The localized fights against terrorism of 2001 have not been successful, and by 2015 matters are much worse. Under these conditions, it is very hard to visualize anything other than a deeply negative economic condition. Look what 20 box cutters led to in the first two months after September 11th. Even with great success on the ground in Afghanistan, people were not flying and there were all kinds of negative economic consequences from what had happened. Only as the weeks passed without further attacks (except for the still unexplained anthrax attacks) did the economy show signs of recovery. If we posit a much nastier world, the economic consequences will be very severe, potentially inducing a depression. This is a world in which the bad guys are really winning and our economic strength is really receding.

Another factor that needs to be considered in this future is the potential impact of a "Lone Ranger" in which a Ted Kazinski-type of individual, someone disenfranchised from American society, seeks to exploit the chaos for his own benefit. This may be illustrated by the recent anthrax attacks, where we do not know whether these events are coupled to al-Qaida or not. It is very hard for the "system" to differentiate between the Lone Ranger and the terrorist threat. We may be provoked into excessive reaction by misunderstanding or misreading the Lone Ranger as part of the terrorist network.

Nuclear Complications of Terrorism

The specter of nuclear weapons adds a particularly grim complication to a future of Global Terror. We only need to reflect on the events since September 11th to see how they might be relevant to the world of 2015. Consider what the ground war in Afghanistan would have been like if the terrorists had nuclear weapons. Consider what might occur if our nuclear-armed ally and key to our Afghan strategy, Pakistan, were toppled by unfriendly forces. What if Russia was uncooperative or if nuclear weapons or nuclear materials leaked from its control? What role will Iraq play? Is it the next state sponsor of terrorism or possibly the next target for our anti-terrorism campaign? Israel, an ally, is generally acknowledged to be nuclear-armed and is situated in a very precarious place. If terrorists had nuclear weapons, they could wreak havoc there, or as we now have experienced, within the United States.

Project these situations into the future. There could be another Afghanistan, maybe Somalia, maybe Sudan, or maybe the lesson for the terrorists is that they cannot exist in any central place. Wherever the staging area, assume that they have nuclear weapons. Even now, it has been speculated that al-Qaida is seeking or might have some Russian backpack nuclear weapons. Fighting terrorists in a nuclear-weapons environment is a hugely more stressful challenge.

In the case of Pakistan, the Taliban might have expected that Islamabad would not have cooperated with the United States, that the masses would have arisen against Musharraf, that al-Qaida sympathizers in the military would have overthrown him, and that the weapons could have been seized and become part of the terrorists' arsenal against us. This hasn't happened, but it would be an important goal for future terrorists, if possible, to make it happen.

In this regard, it is likely that, in spite of the best efforts of the United States and Russia at Cooperative Threat Reduction (CTR), the threat of leakage from the vast Russian stockpiles of nuclear, biological, and chemical weapons is a permanent aspect of the future world. Given the lack of transparency of the Russian security system and the large number of Russian scientists and their depressed economic state, it is unlikely that this situation will be fundamentally changed or that the United States, even with the Russian government's cooperation, will be able to completely cut off Russian nuclear materials or nuclear-weapons suppliers.

In addition, it is very likely that we will have nuclear-armed states willing to sponsor terrorism; this will enormously complicate our lives.

Furthermore, we always have the problem of Israel being provoked into using nuclear weapons, just as the Islamic terrorists undoubtedly want them to do, because it would arguably be the most unifying and galvanizing development for the Muslim world. This is a risky, high-stakes strategy, but it would be more helpful to the terrorists who want more dramatic change than was the case with the relatively restrained actions of Israel in the 1991 Gulf War.

Finally, from the terrorists' perspective, why should the United States prosecute its war aims—to send its ships in and out of San Diego and bombers from the central United States to Afghanistan—with impunity? They surely feel that WMD in their hands would be the great equalizer. While they may not have succeeded until now, it is very likely that they will have much greater capability in 2015.

Regional Nuclear Tensions and Use

Consider a situation in which we manage global threats fairly successfully. Russia has fallen in with the United States for the long term, if for no other reason than as a clear-eyed path toward regaining its economic strength. China is modernizing but at a moderate pace and poses no threat to any state beyond its borders. The great powers' competition is primarily interesting only to historians. Add to this the hypothesized ingredient that the terrorism threat turns out to be completely overblown. Al-Qaida is just smoke and mirrors; it was primarily an Afghan-based operation destroyed 14 years ago. People around the world may still harbor deep resentment against American wealth, life style, and governmental policies, but they cannot do anything about it. And, as a result, global terrorism fades noticeably as a method for violent change.

Rather, this world of 2015 is about intense regional conflicts involving nuclear weapons. It is a somewhat disjointed, disconnected set of regional problems threatening to vital U.S. national-security interests. There is no one central problem but a set of multiple, regional problems: India–Pakistan, China–India, Israel–Arab countries, China–Taiwan, and Korea–Japan, for example. Israel, India, and Pakistan are already nuclear powers. North Korea, Iraq, Iran, and potentially Japan and Taiwan could be nuclear-armed in this future time frame. Tension in the Middle East between Israel and the Islamic states, in Northeast Asia between the Koreas, or between a unified Korea and Japan, in Southeast Asia between China and Taiwan, and even domestic conflict within nuclear states could trigger a regional nuclear conflict, with the potential for escalation to surrounding and more heavily armed allied states.

The weapons in this world increase in number and sophistication—tens to hundreds of nuclear weapons, intermediate-range missiles, fighter aircraft, perhaps some suitcase bombs, and deliverable chemical and biological systems. The United States will have theater and some national-missile defense, perhaps useful for Japan and Taiwan, but more or less irrelevant in the Middle East and South Asia, except for Israel, which is expected to have deployed by then significant national-missile defenses of its own. Even in cases in which the United States is not directly involved, we will use information-warfare capabilities, both offensively to impede threats and defensively to fend off peripheral effects that might harm us or draw us in.

Deterrence in these situations is a pronounced regionally dependent concept, as propounded by Keith Payne.* There is not a one-shoe-fits-all approach to deterrence. What is required is a careful examination of the cultural context in which the conflict occurs. What will make deterrence work in East Asia will not be applicable in the Middle East. There is no one set of applicable grand principles, as was widely thought to be the case during the Cold War.

The U.S. nuclear arsenal in this world is not seen as a highly significant contributor to U.S.

* *The Fallacies of Cold War Deterrence and a New Direction*, June 2001.

national security, and the stockpile is permitted to age without being modernized.

The concomitant economic situation is volatile because in a world marked by volatility in some regions andyet an integrated world economy, a major regional conflict would have a very deleterious effect on the global economic system. A broad-based Arab–Israeli war, for example, that led to widespread destruction of oil fields in the region or a sustained Arab oil embargo, would inflict far greater damage on the United States and world economy than was the case immediately after the 1973 Middle East War precisely because of the interdependent nature of globalization that was not nearly as prevalent in the 1970s.

It is certainly plausible that, by 2015, through some sequence of events, Korea is united—either through war or a North Korean implosion, or in some way we have not thought of, given the deep problems in North Korean society and the volatile foreign policies pursued by Pyongyang. The ironic consequence of a Korean union, even one orchestrated by the democratic South, is that the embryonic North Korean nuclear program and maybe even the recollections of the South Korean program would be retained and enlarged.

The result would be a united Korea as a nuclear-weapons state, with a population of 70 to 80 million, and an almost certain aspiration to become a major regional power in East Asia. It is posited that in such an eventuality, because of deep-seated Japanese–Korean hostilities that emanated from the harsh Japanese occupation of the Korean peninsula from 1910 to 1945, Japan would not tolerate a united Korea with nuclear weapons, no matter what reassurance the United States offered. The reaction in Tokyo would be the development of a dedicated Japanese nuclear-weapons program. A united Korea and Japan, each armed with nuclear weapons, would be a transformative development for the international system, with highly uncertain but clearly dangerous consequences.

Consider another dimension of regional conflict. Many believe that a key motivation behind the U.S. missile-defense effort is to enhance the probability of U.S. conventional intervention with relative impunity in the event of a China–Taiwan crisis or conflict. The reasoning is that China may decide, for whatever motivations, to overtly coerce or attack Taiwan to "reunite the renegade province" with the People's Republic. Beijing would anticipate the United States' conventional intervention to protect Taiwan, which it would counter with a threat of nuclear attack either against our forces in the Pacific or against the continental United States to deter us from this conventional intervention. We would seek to block that threat with our theater and national missile defenses. But this logic could be greatly jeopardized if Taipei, uncertain of American security guarantees, clandestinely acquired a nuclear weapons capability of its own. The net effect would be a highly volatile, nuclear, triangular relationship among China, Taiwan, and the United States, one that has not been widely studied by any of the three governments and that is prone to possibilities of preemption and miscalculation.

So, it is plausible that, 15 years from now, a set of discrete, highly significant, and volatile regional conflict situations are the dominant axes of conflict in the world. Moreover, a variety of combinations within and across these regions could have an unplanned World War I-type of effect if they are not effectively controlled.

Dynamic Cooperation

In the best of possible worlds, armed nations would cooperate in controlling global disorder, would constrain regional conflict, and would succeed in limiting the spread of weapons of mass destruction, as market economies grow and law-based, democratic forms of governance spread. In this case, from an American perspective, there would be a low sense of threat and nuclear weapons would play a greatly diminished role as a litmus test of national power. A concomitant enhancement in the authority of international institutions would follow.

Consider a Francis Fukayama-type "end of history" phenomenon in which democratic institutions are spreading unrelentingly worldwide, with even some Islamic states having joined the democratic fold. We have already witnessed the spread of democracy in all of Latin America except for Cuba. We posit that, in many different forms, democracy spreads further. The capitalist market economic system predicated on the private ownership of capital and means of production and the sanctity of legally binding contracts becomes the norm in societies around the world. This has in fact been the professed goal of American administrations since Woodrow Wilson claimed that the United States was entering World War I to "make the world safe for democracy." In this posited world, Wilson's aspiration is actually taking effect, not everywhere, but in the vast majority of nations.

America's relations with both Russia and China are more productive and stable than they have ever been; perhaps there is even an acceptable variant of democracy taking shape in China. Our relationships with all the great powers are highly positive and indeed there are no major tensions between or among any of these major states. Yes, there is still limited, low-intensity conflict, but there is no first-order problem that threatens global society. There is not even a definable second-order problem that poses the potential for regional war. There is nothing really capturing the attention of the United States' national security community. Analysts have returned to geo-economics; environmental issues are in the forefront politically; wealth creation has replaced military security concerns as we have returned to the attitudes of the "go-go" 1990s, what we might now call the "inter-war" period.

This eventuality would present a challenge because it might well be the most difficult world in which to maintain a sensible level of nuclear forces that would be the mainstay of a credible U.S. deterrent hedge. Political and budgetary support for this capability would likely verge on collapse.

Markets and technology globalize. The world economy prospers. International institutions are ceded greater authority and gain effectiveness; the threats of WMD proliferation and potential use have largely receded from public consciousness and governmental decision-making deliberations. This is about the most positive world we could posit.

Remember, this is the world of 2015 or 2020. Could we have foreseen the world that we have today in 1987? Not so easily. But, it is not impossible that the good guys and the good ideas (as we define them) win. There is no major military competition or threat. Homogeneity begins to appear, and governments and economies begin to look like each other. Deployed weapons are being reduced to unprecedented low levels. Chemical and biological weapons stocks are being systematically destroyed. The United States has some credibly effective theater missile defenses, but it still has not deployed a robust national missile defense that could credibly protect the American homeland against a large-scale missile attack.

The main U.S. objective in information warfare is now wealth protection. We wish to ensure that some hackers in the Philippines or in the United States are not able to take down Merrill Lynch.

Deterrence in this world is seen largely as a relic of history. The operating principle is now mutual assurance, how to make all nations healthy and assist in their development for the benefit of all. Weapons stockpiles are simply aging, with minimal investment in military research and development. Military affairs are rapidly becoming a backwater field, with limited budgets, that attract few first-rate individuals (reminiscent of the situation in Japan in the 1970s).

It is a stable, productive, and prosperous world, with living standards rising on every continent. Strategic issues in this world revolve around energy, water, and the global environment. Given our experience in the 20th century, this may seem far-fetched, but it is not impossible. And, in principle, our policies should be aimed at producing this world.

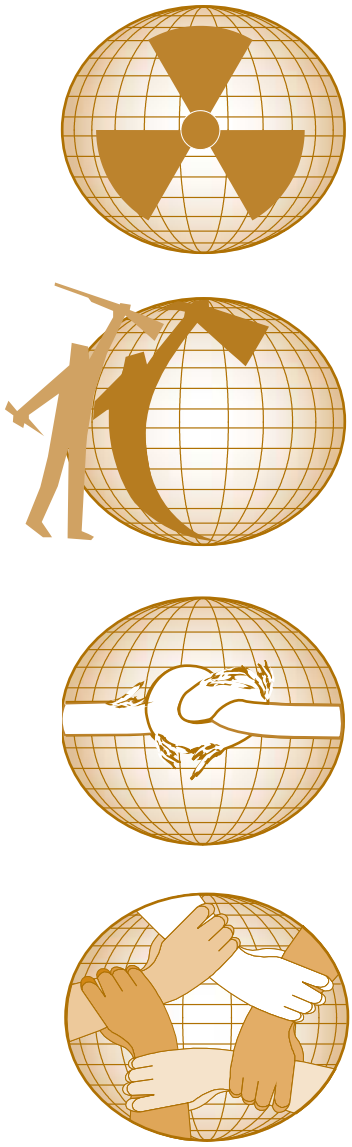
Our challenge would be to transform a world dominated by the nuclear giants, global terrorism, regional nuclear conflict, or a combination of two or three of these, into this fourth world of dynamic cooperation. Yet this optimistic world raises serious questions about what our policies should be regarding security, weapons, and defense. We would have to prepare for peace. This is something that those responsible for our nuclear capabilities must think about. How might we prepare for peace?

Seek the Best, Hedge Against the Worst, and Expect Surprise

While these future worlds are not specific and not operationally detailed, they provide the range of contexts that points to both the policy options appropriate for adoption and the weapons systems needed to serve these policy aims. Dynamic Cooperation is to be hoped for and—some might say—should be the goal of our international policy and of our economic and military commitments. However, we should be prepared for surprises and intelligently wary of the actions of other nations, with adequate military force in place and the plans and preparedness to increase our forces appropriately and as quickly as needed.

Chapter 2
Report of the Policy and Diplomacy Working Group

Leon Sloss, Chair



Introduction

Chapter 1 on Threats, Scenarios, and Transforming Events laid the basis for what we discuss here in Chapter 2 on Policy and Diplomacy. Our goal has not been to prescribe any policies, as tempting as that might have been to some, but rather to identify the range of policy issues and discuss how we might go about addressing these issues. The Weapons, Operations, and Infrastructure Group would have liked our group to provide more specific policy prescriptions so that they could design nuclear forces to go along with those prescriptions. Unfortunately, we could not be that accommodating. As policy planners and weapons planners, we do not know what the future world will be like. Therefore, we have to develop policies, plans, and programs flexible enough to meet whichever world evolves over time.

An important point came out very clearly during our discussions. While we need to be prepared for any of the four future worlds, we really should have some idea as to which future world is the most desirable. We concluded that the world of Dynamic Cooperation would be the best way of describing a desirable future.

While we did not have the time in this exercise to develop a complete vision, we did identify some major elements of a desired future world:

- The United States controlling its own destiny without conflict;
- Peaceful resolution of conflict;
- Growing worldwide economic prosperity;
- Effective non-proliferation regime;
- Expansion of political and economic freedom.

We should strive for some things as we prepare policies and capabilities that will allow us to make our way among the four possible future worlds. A slogan that appears to best fit our future course of action is "Identify the future that you want, and prepare for the futures that you don't want."*

The Evolving Nature of a Deterrence Strategy

While the subject of this study is "Whither Deterrence?", it became clear to us that our deterrence strategy really has consisted, and continues to consist, of five elements, as illustrated in the puzzle depicted in **Figure 2-1**: Deter, Dissuade, Defend, Destroy, and Assure (or Re-assure). We refer to this set of elements as D^4A (see box). During the Cold War, all these elements came into play, but deterrence overshadowed the other four. In the later years of the Cold War, we talked more about dissuasion, and with the Strategic Defense Initiative, about defense. We also emphasized that our nuclear posture was not only to deter our potential enemies, but also to reassure our allies, and in fact to assure ourselves that we could manage the Cold War. All of this strategy was built upon the capability to destroy what an adversary valued.

* This study was completed in November 2001 and some significant changes should be acknowledged. Since that time (a) the United States has announced its intention to terminate the Anti-Ballistic Missile Treaty, (b) the United States and Russia have reached an agreement on a new arms-control treaty, and (c) the Nuclear Posture Review has been completed and provides new guidance.

As we move from the inter-war period into the new war period, deterrence is taking on a different dimension. Some of our group thought that deterrence should not be at the center of strategy. Indeed, we are now concerned with much more than deterrence and have considered adding a sixth element, "de-motivation," i.e., to deal with the underlying motivations that cause people to wish to attack us. As **Figure 2-2** illustrates, many more countries are involved in today's D^4A world than during the era of the Cold War.

Definitions of the major elements of a complete deterrence strategy, referred to as "D^4A" in this paper.

Deter—to frighten, to keep or discourage (a person) from doing something by instilling fear, anxiety, doubt, etc,
Dissuade—to turn a person aside (from a course, etc.) by persuasion or advice. To advise against (an action).
Defend—the act or power of defending or guarding against attack, harm, or danger.
Destroy—to tear down, demolish, break up or spoil completely, ruin. To bring to total defeat; crush.
Assure—something said or done to inspire confidence, as a promise, positive statement, etc.; guarantee.

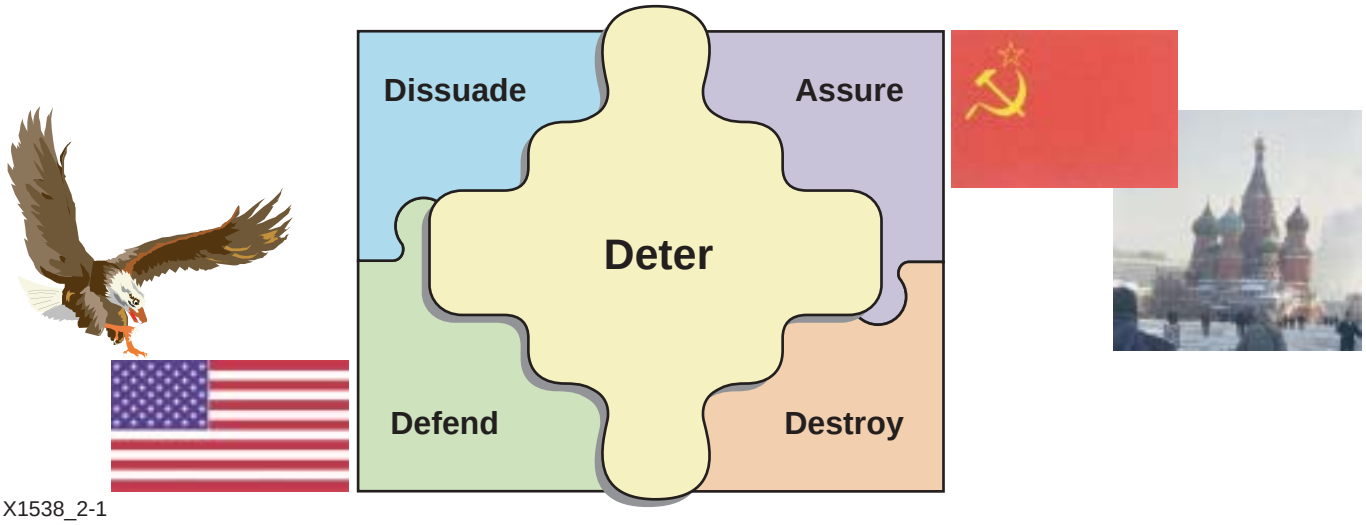


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Figure 2-1. A Cold War picture of deterrence, illustrating both its bipolar nature and its heavy reliance of the "deter" element of D^4A.

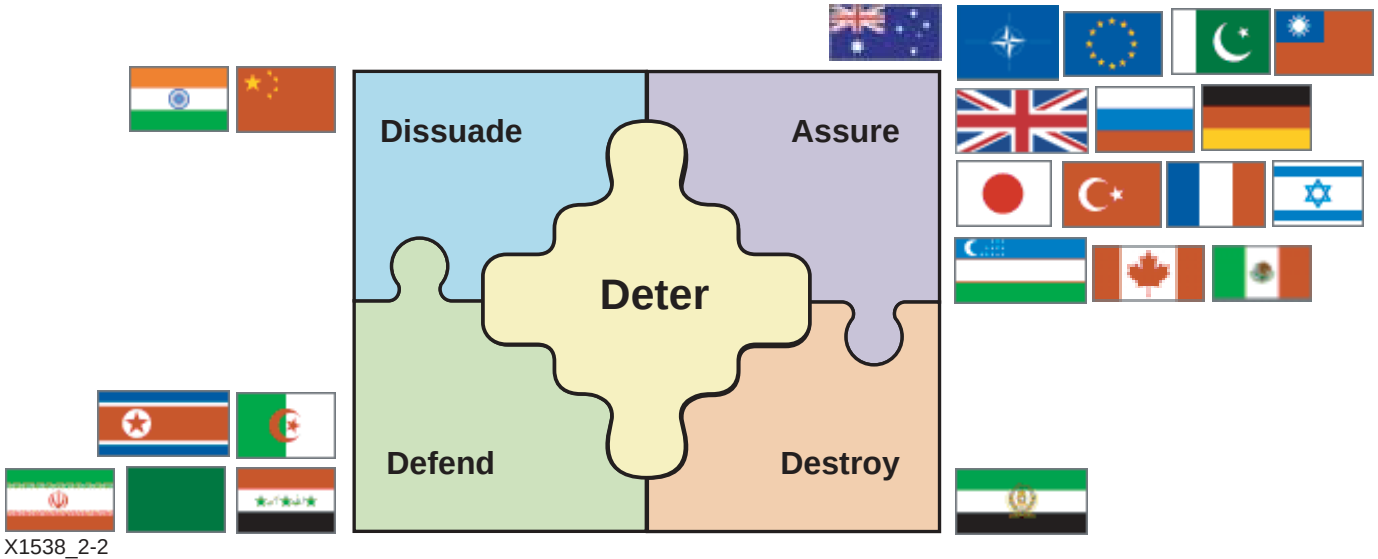

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Figure 2-2. In today's more complex and multi-polar world, deterrence must be viewed as an appropriate mix of the elements of D^4A.

We use these descriptions of D^4A (and to some extent, D^5A) as a framework for addressing in a symmetric way the possible futures: nuclear giants (Russia and China); terrorists and their supporters; and regional nuclear conflict. We then provide some general guidance to the nuclear-force planners. In the following discussion, we emphasize what we know and what we don't know and some possible courses of action.

Nuclear Giant—Russia

Our relationship with Russia is depicted in **Figure 2-3.** The nature of our relationship with Russia has changed, moving beyond the major Cold War element of deterrence to a strategy that includes elements of dissuasion and assurance: to dissuade in the long-term Russia's buildup of weapons and other elements of policy we would rather they did not do and to assure Russia about our intentions. The other elements of defend and destroy still exist, but are far less prominent.

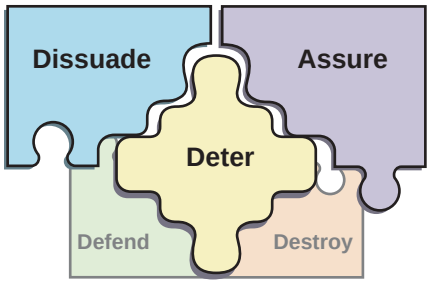

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Figure 2-3. D^4A as viewed in our evolving relationship with Russia.

We are developing a new strategic relationship with Russia that needs to include establishing a hedging strategy on our part, and strengthening the existing Cooperative Threat Reduction (CTR) regime.

New Strategic Relationship with Russia

What We Know

We know that the old strategic relationship is obsolete, and that both countries seek a new relationship. Both sides at the highest levels have demonstrated the will for change, but major details still need to be resolved, specifically with regard to the Anti-Ballistic Missile Treaty (ABMT), the START regime, and Russia's relationship with Western nations (both political and economic).

What We Don't Know

We don't know whether Russia can be persuaded to accept the informal arms-control regime that the U.S. administration is now promoting. There are questions about Russia's continued relationship with NATO and how well the Russian economy will fare. Whether Russia will be a future competitor in military terms depends very much on how its political system evolves and how well its economy does over the next 10, 15, or 25 years.

An important question is how Russia is going to respond to our missile defense program. Finally, an important internal problem is Congressional reaction to the idea of arms control without agreements. Congress has so far been silent on this issue.

Developing a Hedging Strategy

What We Know

Our strategic relationship with Russia includes reducing our active nuclear capabilities. However, in so doing, we have to develop a hedge. Substantial reductions in U.S. and Russian strategic forces have been agreed to. Meanwhile, the U.S. nuclear-weapon design and production capability has been eroding. Senior military officers and planners lack experience with nuclear issues. This means that we have to maintain a hedge against future unknown contingencies. The hedge includes forces in being and active reserves. There remains an ongoing debate in Washington regarding the balance between how many and what kind of forces, along with the other components of a hedging strategy, such as the production infrastructure. The government is currently struggling with what the balance should be. The role of non-strategic nuclear forces is an additional key factor that needs to be considered. Moving the hedge from today's concept to reality will involve a series of decisions as to how much we invest in or maintain the various components that might make up the hedge strategy. Chapter 3 (Weapons, Operations, and Infrastructure) addresses these components in more detail.

What We Don't Know

We have yet to develop the specific details of the necessary hedge. We also need to convince the Russians that a hedge is not a threat. To the United States, a hedge is based on the capability to reconstitute forces and is part of a sensible deterrence strategy. We believe that by reducing our nuclear inventory to much lower levels and by demonstrating our commitment to transparency and openness, we will assure the Russians. However, we feel such reductions are possible because we will retain the capability to reconstitute our forces if needed. In

contrast, the Russians look at such a hedge as a potential threat, and there is some legitimacy to their concerns. The challenge is how to provide assurance to the Russians that as we move to a hedge strategy, the hedge will be exercised if and only when we need it and not without consultation with them.

Cooperative Threat Reduction

What We Know

We know that CTR has demonstrated considerable utility. It has helped the Russians get their nuclear weapons and materials under better control, and get their nuclear personnel more productively employed in non-weapons-related activities. However, CTR has been an imperfect program. The leakage of Russian knowledge, diversion of materials and weapons, and the misuse of facilities remain serious risks. CTR has been effective at reducing risk but will not fully eliminate it. There have been waste and corruption during the program's implementation, leading to skepticism by many in Congress and the administration. However, attitudes could change as the result of our evolving relationship with Russia, and questions are being asked about where we want to go with CTR in the future.

What We Don't Know

Some say that we will probably have to live permanently with the prospect of leaking weapons of mass destruction (WMD) technologies from Russia. Others are not quite that pessimistic. We certainly need to continue working the problem of leakage, even though we may not have a perfect solution to it. The goals for the future CTR program have to be spelled out. We need to learn how to overcome Russian secrecy and reluctance to share information, although this may be somewhat improved by the post-September 11th environment. We need to work toward minimizing the waste and corruption in the program. All of this is important if one believes that CTR is still a useful exercise. However, support in Congress has been uneven over time, and, obviously, sustained funds are needed to make the program work.

Courses of Action

Our group identified some possible courses of action with respect to Russia. We believe that our overall goal is to normalize relations with Russia—to have a relationship with Russia comparable to the relationships we have today with our other allies. It will take time to achieve this, and it will not always be a totally smooth relationship. However, that is where we should be heading.

We generally believe that the non-treaty mechanism is the direction in which to go in arms control, although there was some debate in our group about this approach, as also became evident in the roundtable discussion (Chapter 4). The purpose of such an approach should be to advance mutual assurance and trust. If this approach is going to be successful, it will require confidence-building measures to codify the relationship and some sort of institutionalized dialogue. The administration seems to be indicating that formal arms control is obsolete, that traditional treaty regimes are obsolete, and that we don't want to spend years and years negotiating treaties. This may put some of us out of business, but we may be happy to go out of *this* business. In return, we have to offer something that will provide assurance, both to us and to the Russians. Hence, we suggest some sort of mechanism, some sort of institution, that creates a formal dialogue giving both parties the assurance they need to move ahead in this new relationship without the elaborate treaties that we have had in the past.

We clearly need to give more substance to the hedging strategy. We need to size the nuclear infrastructure in a way that maintains the proper hedge. However, there is a trade-off between the elements of the hedging strategy—between alert forces, non-alert forces that are still in the active inventory, reserve forces, non-nuclear strategic forces, and an infrastructure that includes R&D capabilities, production capabilities, and the human resources required to make everything operate. This trade-off has been part of the ongoing debate in Washington on the new U.S. nuclear posture. Hedging today is little more than a concept that many people have spent a lot of time working on. It now needs to be given substance, particularly to balance the elements and fill the gaps with real programs and adequate funding.

Related to our dialogue with the Russians, we need to increase transparency—not just about nuclear forces but also about our infrastructures to avoid misunderstandings. We need to seriously consider how to embed CTR within the new emerging strategic relationship. If there is indeed to be a new relationship, we should be equal partners with Russia in implementing CTR. We must continue to hold Russia accountable for the security of their WMD. However, CTR should evolve from a welfare-like activity to mutual cooperation. The new CTR, or its successor, should continue to focus on the proliferation of not only

nuclear capabilities and materials, but also chemical and biological. Finally, we need to seek a way to marshal congressional support for a revitalized CTR program embedded in a new strategic relationship.

Nuclear Giant—China

Our current relationship with China is primarily based on deterrence and dissuasion, as depicted in **Figure 2-4**. However, we are in a weak position to dissuade because of the current absence of a strategic dialogue with China. Defense is depicted with significant uncertainty (with a question mark). The United States has stated publicly that defense is not a major component of our strategy toward China. However, it is clear that the Chinese do not believe these statements. A major goal of a new strategic dialogue would be to address these different perspectives. Of course, it is unreasonable to believe that a major missile-defense program will not have some impact on China. Hence, defense clearly remains a part of the picture, though not at the center of the United States' declared strategy. Absent, and in need of consideration, is the issue of assurance.

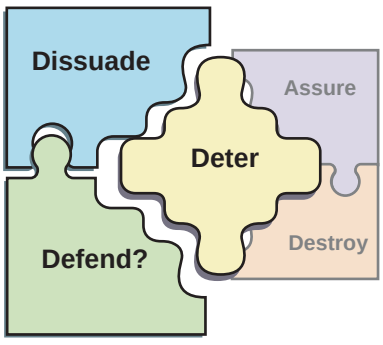

Figure 2-4. D^{4}A as viewed in our evolving relationship with China.

There is little consensus in the community of China experts about where China's defense policies and programs are heading and what we ought to be doing about China. A wide variety of views makes the development of a coherent policy difficult. The United States–China strategic relationship, however, has changed over the past decade in some clearly important ways. Chinese economic expansion has enabled them to invest more heavily than in the past in their defense programs. Two decades ago, China was talking about four modernization programs in the areas of agriculture, industry, economy, and military. At that time, the military was clearly the lowest priority, and some will argue that it's still the lowest priority. However, it is clear that the military is certainly receiving more resources than it did a decade or two ago. Furthermore, the decline of the Soviet threat has not only affected the U.S. defense posture; it has also affected China and has allowed it to reallocate many of its defense resources to the Taiwan Straits.

Hence, we see a growing and modernizing Chinese defense establishment, indicating an apparent change in priorities. As a result of this modernization, the Chinese have a significant theater missile force with nuclear capabilities, representing a potential threat to our naval forces and our bases in Asia. Consequently, in the event of another Taiwan crisis, we will have to consider carefully sailing the 7th Fleet up through the Taiwan Straits as we have in the past. China's strategic missile forces have grown from what was merely a token force involving a handful of weapons, to what it perceives (and we should likely perceive) as a minimum deterrent. That force is not in any way equal to the United States' capability, but is still more than a token force. Furthermore, the experts disagree on where China is going with its forces in the future.

We think China's strategic goals, broadly speaking, are to control events in Taiwan, and should there be a conflict, to deter U.S. intervention. Is China interested in a broader regional hegemony? There are different views on this. Despite the growth and modernization of China's military forces, we question whether it will have the ability to become a real peer competitor with the United States for many years.

In the following discussion, we address the evolution of the United States–China strategic relationship and Taiwan security.

Political–Military Relationship

What We Know

China is and will continue to be a major player. Its represents a major market and source of investment opportunity for the United States, but China itself has clear ambitions of being a strategic and political leader in Asia. Current diplomatic relations with China are difficult. Our strategic dialogue with China is virtually non-existent. Our economic and trade relationships have at times been tenuous. Unresolved human rights issues have exacerbated these relationships. China is modernizing its military forces, including its nuclear forces. Finally, China sees the United States as its major competitor in Asia.

What We Don't Know

We lack knowledge in the following areas:

- **Chinese leadership**. There is going to be a change in Chinese leadership over the next year or so, and we do not know what the composition or outlook of that leadership will be.

- **Chinese political stability**. We may be worried less about China as a great power, than whether China is a place of political instability. There is no agreement on this issue among U.S. experts. The policies of a newly emerging leadership are uncertain.

- **China's economic growth.** China's growth rate has been exceptionally high, but there has been some slow-down recently. China is the one major power in the world today not suffering a recession. Its future clearly depends on how resources among the four modernizations mentioned above are allocated. This is an area of uncertainty. Also, there is a major question whether democratization will come with economic growth.

- **Long-term military ambitions in Asia.** There are very strong and differing views about China's ambitions. Some argue that China seeks to become an equal with the United States. Others say that China is certainly going to be concerned with its economic growth for the next 20 years, and that with its internal problems, China lacks military ambitions beyond ensuring that Taiwan does not achieve independence.

- **How U.S. policies and actions influence China's policies and programs.** There are major disagreements within the expert community over whether the modernization of China's military, and particularly of its nuclear programs, is something that China has initiated independently or in response to U.S. actions.

A key question is how our allies, particularly in Asia, will respond to China's policies, and to our responses to China's policies. Japan and South Korea are particularly affected, as is Russia. The potential remains for Japan to be dissatisfied with the United States in response to a Chinese military buildup, thus leading Japan to pursue its own nuclear capabilities. This is a very important issue that needs to be addressed further.

The bottom line is that we still have a very limited knowledge of Chinese military doctrines, plans, and programs compared with what we developed with respect to the Soviet Union during the course of the Cold War.

Taiwan Security

What We Know

It is clear that China will not tolerate Taiwan's independence. A declaration of independence is unlikely in the formal sense, but questions remain as to what actions China would construe as irreversible moves toward independence. Were independence to actually be declared or appear inevitable, this could trigger military action. However, uncertainty remains as to what the precise triggering event might be. In this context, we note that Taiwan has been gradually moving toward greater *de facto* independence.

The United States remains committed to Taiwan in a somewhat ambiguous fashion. We believe the current administration would remain committed to Taiwan if there were a military attack; however, the administration also feels a strong obligation to prevent that from occurring. The U.S. leadership has stated that U.S. action cannot be ruled out. However, U.S. stakes are less vital than China's, which leads to an asymmetric strategic situation. China would seek to deter intervention by the United States, possibly using nuclear weapons against us in the region. As a result, there are also possible threats to the U.S. homeland if escalation occurs.

What We Don't Know

Nearly all the experts agree that were Taiwan to declare independence, China would take action to prevent it. However, most people also agree that Taiwan would not be so foolish as to declare independence. The issue is whether there are other actions, short of declared independence, that would trigger a Chinese response. There are many questions. What tools would the Chinese use in response? How do we continue to restrain Taiwan to prevent such an incident from occurring without undermining our long-term effort to deter China, if that should occur? How do we deal with Taiwan in a way that doesn't look to China as though we're abandoning our defense of Taiwan? How do we handle the situation so that it doesn't appear to China that we are encouraging Taiwan's independence? These are questions we have been dealing with for decades. Should a conflict arise, we must assume that China will seek to deter the United States from intervening in the region, and it will use whatever nuclear posture necessary as part of its deterrent. Thus, what do we, the United States, need to do to prevent

ourselves from being deterred? For decades, we have talked about deterring others, but in this situation (and there may well be others) we may become the object of deterrence. We clearly need to consider how to address such a situation.

Courses of Action

A critical course of action for the United States is to continue diplomatic efforts to avoid a conflict over Taiwan. There should be no fundamental change in the U.S. "One China" policy, and we should continue selective military assistance to Taiwan while urging its continued restraint with respect to independence. We should continue to discourage military action by China and to maintain a posture of deterrence.

The group considered three options, presented by Brad Roberts in a recent paper* on the U.S.–China relationship, for examining the modernization of China's nuclear posture. The first option is an attempt to trump China's modernization, in effect to keep China in a state in which it has at least a very minimal deterrent. This requires a very significant U.S. defense capability. It also requires us to develop a pre-emptive capability against China, which in turn requires improved target acquisition. One of the things that China has done to make a very small strategic nuclear force effective as a deterrent is to rely heavily on concealment and deception. We know China has only a few weapons, but we do not always know where they are. Accordingly, intelligence improvements are needed if we adopt this option.

The second option is to tolerate vulnerability, probably a little more vulnerability of the United States to China than we have tolerated in the past. This can be considered "asymmetric mutually assured destruction" (or "asymmetric MAD"). If we borrow a phrase from the French, what China would have in the way of nuclear forces would amount to a Chinese *force de frappe.*

The third option is to maintain a hedge. We accept the fact that China's buildup and modernization are going to occur to some extent. However, the United States maintains the option to re-orient its missile defense toward China if needed. But until the needs arise, we live with what China is doing.

Our group believes that it is most critical that the United States engage China in a strategic dialogue. We are in the same situation today that we faced with the Soviet Union in 1970, when there was significant misunderstanding and misperception by both sides. China clearly does not trust what we are saying about our missile defense program—"it's not directed at China"—and we feel very uncomfortable about what China is doing in modernizing its military forces, even though it may be benign development. We know how difficult such a dialogue will be in view of our long-time efforts to do so. However, this remains a high priority in developing a China policy. Such a dialogue would include *inter alia* clarifying the role of arms control, resolving trade issues, and discussing human rights.

Terrorists and Their Supporters

Figure 2-5 depicts the situation with respect to terrorists and their supporters. Here the balance of D^4A is again different. Clearly, today's emphasis is on destroying the terrorists and holding accountable those who support them. We are currently placing significant emphasis on defenses. Prior to September 11th, our primary focus was on ballistic missile defense (BMD), and now we have added homeland defense. The utility of BMD is not clear in situations regarding terrorists and their supporters, but clearly homeland defense is an important element of our strategy. We most certainly should not give up on deterring terrorists, and in fact we have developed some ideas on how they might be deterred or discouraged and how to deal with the sources of terrorism. Finally, we must distinguish between domestic terrorism, state-supported terrorism, and rogue nations.

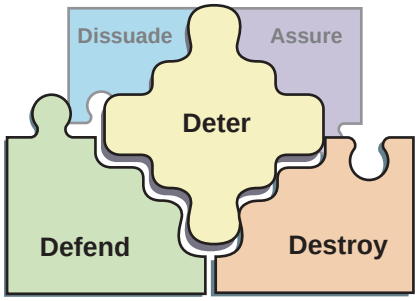

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Figure 2-5. D^4A as it might be applied to terrorists and their supporters.

Deterring Terrorists and Their Supporters

What We Know

We certainly learned on September 11th that the United States is vulnerable to large-scale terrorist attacks. It is clear that a major terrorist attack involves some sort of support from a nation-state, whether the state merely provides

* Brad Roberts, *China–US Nuclear Relations: What Relationship Best Serves US Interests?*, Institute for Defense Analyses, Alexandria, Virginia, IDA Paper No. 3640 (August 2001). Available through the Internet on www.dtra.mil.

training bases or provides weapons. There are nations with bitter grievances against the United States that might be willing to support covert attacks against U.S. interests as part of their national policy. It is clear that the traditional deterrence of the Cold War—i.e., the threat of retaliation that will inflict great damage—is not going to deter terrorists because many of the terrorists are already committed to their own destruction for their higher cause.

Clearly, we have learned from the last six months that our intelligence resources are limited, and may in fact be very limited in relevant areas, as well as potentially misallocated. Next, we make a specific suggestion in this regard.

What We Don't Know

We do not know with certainty all the sources of terrorism. The conventional wisdom is that we certainly cannot deter terrorists in the traditional way, but we may be able to deter the *supporters* of terrorism in traditional ways. It has been suggested that we might deter terrorists by threatening their families. However, our working group thinks that a more productive way of deterring terrorists is a robust defense in combination with an effective campaign against terrorism. A good example is the case in which our military campaign in Afghanistan succeeds (or is perceived to succeed), and we develop an effective homeland defense. Such success will not fully deter terrorists, and most terrorists will not be deterred by the threat of their destruction, but it's not clear that they are prepared to fail. Hence, if we can create a defense that makes it increasingly difficult for them to calculate success in an operation, they may not make an attempt. They may abandon a particular operation and try another. As our defenses become more robust, they may find it increasingly difficult to find any way to get through. In this way, effective defenses can indeed serve as a deterrent.

There are many gaps in our knowledge of potential adversaries, and the information we do have is currently poorly integrated. We have both government and non-government resources that we are not fully utilizing. For example, on September 12th, when Afghanistan suddenly rose from very low on our priority list to Number 1, we found that there were quite a few resources around the country that knew about Afghanistan, but they had not been properly mobilized to be useful to the government. In addition, because of legal constraints preventing the sharing of intelligence resources and information between domestic and foreign agencies, we missed some indicators of these events.

Courses of Action

We recommend the following courses of action:

- We obviously need to strengthen our human intelligence sources. In addition, several members of our group propose the establishment of a new entity to provide a continual assessment of foreign threats. We see such an entity as being outside the government, but lodged in an existing organization. We need to supplement our intelligence resources with an institution/organization working consistently on gaining a better understanding of rogue states and terrorist groups, and that has very close ties to the intelligence community, the policy and operation planners, and the academic community. It would be an organization that can integrate the non-governmental and governmental knowledge bases and that can draw on resources not normally prepared to work within a government bureaucracy (such as academic-area specialists), an important driver for locating such an entity outside the government. The organization would have both geographic expertise (detailed expertise on particular countries or particular groups) and operational expertise, with people who understand how to apply their knowledge to operations and can interact with the operational planners and the intelligence community. Not all of the people who contribute to this organization would be staff of the organization. The organization would have strong links and partnerships with knowledgeable international experts. Also, many who might become a part of the organization could be recruited on a contract basis. The need for organization of such an entity generated some controversy. Some people believe such an organization should be within the intelligence community. Others believe that it should be a supplement to the intelligence community because an entity with the kind of persistent agenda we are suggesting is difficult to achieve within the intelligence community.*

* The Defense Department has initiated a long-term study at the National Institute for Public Policy (NIPP) to assess deterrence in the new context, along the lines suggested in this study.

- We need to review U.S. declaratory policy in response to the use of WMD by terrorists.

- We need to strengthen our intelligence partnerships with other states.

- We need to develop and maintain alliances in regions of concern. Such alliances can serve to discourage further proliferation of WMD, enhance U.S. intelligence, and help with logistical support. Maintaining alliances will not be easy. There is likely to be considerable strain on the alliance structure that we have created in the current fight against terrorism. Currently, there is a lot of enthusiasm, but some of it will not last.

- Finally, we need to explore further possibilities for deterring and dissuading terrorists and their supporters. We need to examine whether an effective homeland defense program will deter some terrorist actions. Deterrence is not foolproof. However, a terrorist who may be willing to sacrifice his life for his cause may not be willing to do so if he thinks he will not succeed. If the probability of failure appears high, it does not mean he will give up, but he may look somewhere else. If we develop a robust defense, then we may narrow the options open to the terrorist. Traditional deterrence may be more effective in regional conflicts, which we will discuss below. In addition to military programs, we need programs to address the root sources of conflict, which are most certainly not well known. There are important questions to pursue. Would humanitarian aid help dissuade and de-motivate would-be terrorists or their supporters? Would new approaches for providing aid to facilitate economic development be effective? Can we deny success to terrorists though pre-emption and homeland defense?

Regional Nuclear Conflict

Figure 2-6 depicts the situation with respect to regional nuclear conflict. Here, the balance of D^4A leans toward dissuasion and assurance, with deterrence playing a somewhat smaller role.

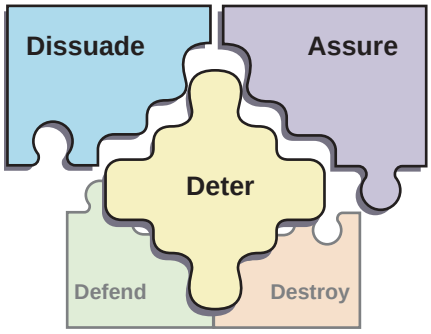

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Figure 2-6. D^4A as it might be applied to deter regional nuclear conflict.

There remains a long-standing debate about the correct U.S. posture with respect to deterrence of WMD use in regional conflicts. The United States has had a somewhat ambiguous policy. The policy has been brought to the forefront at times when we needed it, as happened during the Persian Gulf War. Many people believe that our policy is ambiguous because we say on the one hand that we will not use nuclear weapons against any state that does not use nuclear weapons (admittedly an oversimplification), but at other times we have threatened nuclear use either indirectly or directly if someone should use chemical or biological weapons against ourselves, our forces, or our interests. There are those who prefer the ambiguity of this policy, but there are those who think we should be more explicit. We should propose a policy of no first use of WMD, yet reserve the right to respond if any WMD is used first. Some in our working group do not see any great need to clarify the policy, but there are others who think clarification is desirable.

Deterrence and the U.S. Role

What We Know

We know that countries involved in regional conflict have WMD capabilities, and that WMD has been used in some regional conflicts. We know that proliferation has occurred and continues. We know that nuclear weapons and other WMD have played, and will continue to play a role, even if not used. Finally, we know that the United States is hesitant to become involved in regional conflicts, but is willing to provide support to allies in the form of weapons, intelligence, and advice.

What We Don't Know

We do not know whether the use of WMD can be deterred in regional conflicts. An important factor will be U.S. interests in the regions of concern. There are many gaps in U.S. knowledge of potential adversaries. We lack adequate understanding of the roots of conflict and how to deal with them. Secondarily, it is not always clear what image the United States is projecting, and what role the United States can and wants to

play in deterring conflict. The United States was not a central player in any of the regional conflicts discussed in Chapter 1. However, this does not minimize the potential role we have to play in regional conflicts (for example, in the Middle East). It is important, however, to remember that we are dealing with very different situations: the Middle East, Korea, the Taiwan Straits, and India–Pakistan, each one of which has differing origins and history. In each region, the U.S. role and interests vary. However, a common thread in all the scenarios is that WMD are involved; and even if not used, they could certainly overshadow the conflict. This would be true whether looking at India–Pakistan, Korea, or the Taiwan Straits.

Nuclear Weapons

What We Know

We know that our existing weapons were not designed for current threats, and that new weapons can be designed to reduce collateral damage. We also know that there exist a limited number of targets inaccessible to current nuclear weapons, for example hardened and deeply buried targets. We believe that nuclear weapons could be effective in deterring use of WMD by rogue states. It is also true that if U.S. design and production capabilities are not utilized, they will atrophy over the next decade. There are also legal restrictions with respect to the development of new weapons.

What We Don't Know

We do not know whether more discriminating weapons would strengthen deterrence, or whether a U.S. president would be more inclined to use such weapons. We do not know whether an adversary would believe the president would use these weapons; thus, their value in enhancing deterrence remains unclear. The response of our allies to the use of such weapons is uncertain. It is also not clear that we can foster the necessary political support to develop such new weapons. Another important question to address is the effect on stability if such weapons are pursued, namely whether development of such weapons would increase the likelihood of use or entail the crossing of a "nuclear threshold."

Courses of Action

As discussed above, all of the regional situations are different. In some, we already have alliance relationships or troops stationed in the region. If a conflict breaks out, we could well be involved or drawn in. In some cases, we may merely provide moral support, while in others we may be more significantly involved. In any case, we assume that some of the countries in these regions have nuclear weapons and this fact alone will likely influence the possible conflicts. Our courses of action should include the following:

- We must be prepared to assure our allies (Japan, Korea, Israel) that the United States has a capability and will to protect them, and that they do not have to go out and develop their own capabilities.
- We must continue to dissuade the acquisition of WMD. That is part of our policy now, for example with Iran and North Korea. There are different views as to how successful we have been with North Korea, but we have tried. We have had a program to deal with North Korea, and that program must be pursued.
- We need to dissuade the use of WMD, for example in the case of India and Pakistan.
- We need to be prepared to deter the use of WMD and to prevent ourselves from being deterred, as was discussed in the case of China and Taiwan.
- We need to think more about inter-war deterrence in a new context. We need to address the potential role of U.S. nuclear weapons, if a weapon of mass destruction is used in a regional conflict.
- We need to defend against WMD. It has become clear since September 11th that we are not just talking about, or even primarily focusing on, National Missile Defense (NMD), but homeland defense as well. Indeed, we need to develop a holistic approach toward defense so that NMD fits into a much broader defensive framework.
- We still need to be prepared to destroy those military capabilities that threaten the United States.

Guidance for the Future U.S. Nuclear Posture

To provide a transition into the chapter on Weapons, Operations, and Infrastructure, we have developed the following guidance that might be given to the force planners.

Role of Nuclear Weapons

First, we believe that in addition to a broad strategic vision, there needs to be strong support by the U.S. government at the highest levels for the continued role that we envision for nuclear weapons, and specific actions to emphasize their importance to U.S. security. Many of the actions suggested in the next chapter will not happen unless the administration is clear that nuclear weapons still play an important role in our security strategy.* Certainly, nuclear weapons will not play the sort of role they played during the Cold War. However, most would agree that an important role continues. Hence, the role of nuclear weapons needs to be defined to accomplish actions related to maintaining the infrastructure and capability base.

Impact of Strategic Reductions

We need to examine the impact of strategic reductions with Russia on our other relationships, particularly our allies and China. We are also saying that while Russia is not really an important factor in designing our nuclear forces, it is the central element in our reduction strategy. Even though our main focus now is terrorism, a main security concern prior to September 11th was China. The main issue addressed when the Quadrennial Defense Review was prepared was how many regional conflicts we should be prepared to engage in. Right now, our nuclear posture is being defined by our relationship with Russia, and we are talking about whether the number of weapons should be 2,700 or 2,200 or 1,700.† These numbers also affect how we proceed with missile defense.

Maintaining a Capability Base

We need to sustain the capability base for weapons production if we are going to have a hedge that includes a powerful infrastructure. We need to exercise the design, production, and even the testing of nuclear capabilities. We most certainly need to maintain the human resource skills. As for modernization of delivery systems and warheads, we had a considerable difference in our group about the importance of modernization. We could agree, on the one hand, that to sustain the capability base we needed to utilize the full nuclear infrastructure. However, we also agreed—this is a paradox—that we could not support a program of designing new nuclear weapons based solely on the argument of sustaining capability—that we have to have some missions, some roles, some requirements for these new nuclear capabilities. Still, we could not reach consensus on what those requirements were.

Modernization

We do see two broad options with respect to modernization of the nuclear-weapons stockpile: adapting current systems and developing new systems, of which there are many. One of the reasons we're uncertain about the requirement for new weapons is that a great deal can be done in adapting current systems to new capabilities. The other and more controversial issue is the development of new systems. Some are of the view that we should be developing new systems primarily to sustain the capability base, but again, there is certainly no consensus. The bottom line is that in order to resolve the issues surrounding modernization of the nuclear stockpile, at least for strategic purposes, we must address all of these outstanding questions.

On the other hand, development of new systems should be seriously considered for regional theater requirements. The current stockpile is not designed for present or likely future threats. New technologies should be incorporated as the stockpile is refurbished. To accomplish this, the legislative prohibition against developing new low-yield weapons should be removed (see Chapter 3).

Defense Options

We need to proceed deliberately to develop and test a range of NMD options. However, it became clear over the course of this project (and most especially post-September 11th) that we want to proceed in a way that incorporates Russian concerns and the concerns of our allies. NMD has become a more important element of our policy, and we believe it is an inevitable element of our policy that we are not just going to go off and abrogate the Anti-Ballistic Missile Treaty (ABMT).** The dilemma that existed before September 11th is

* Some of this has been addressed in the recently released Nuclear Posture Review.

† At this writing, the United States and Russia are poised to sign a treaty to reduce the number of long-range nuclear warheads over a ten-year time period.

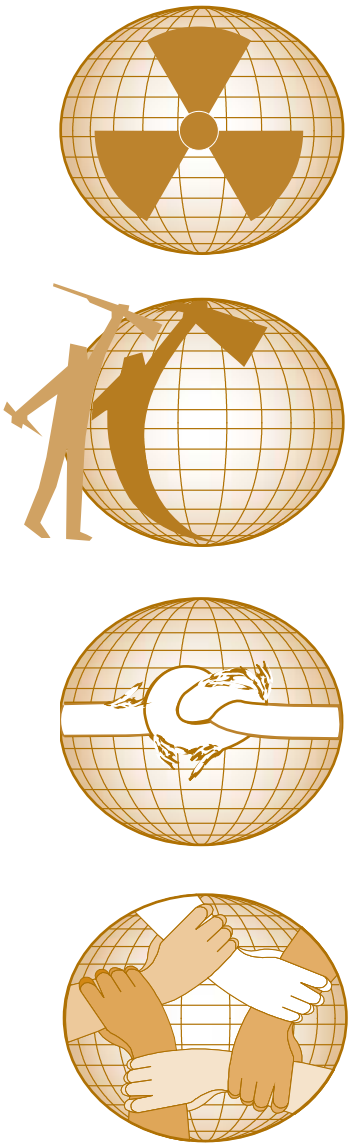
** On December 13th, 2001, President Bush submitted to the Russian Federation the formal intent of the United States to leave the ABMT. The United States withdrew from the treaty on June 13th, 2002.

still with us: if the test program is going to proceed into the future months, it will inevitably run up against the ABMT. This is an unresolved issue. It seems that the policy prior to September 11th to proceed regardless of the concerns of the Russians has been modulated.

Our group did have a broad consensus that we should proceed as rapidly as we can with a theater-missile defense capability. We also need to address how to defend against cruise missiles. Finally, the urgent need to improve passive defenses has become evident since September 11th.

Chapter 3
Report of the Weapons, Operations, and Infrastructure Working Group

Bob Barker, Chair



The task of examining the weapons, operations, and infrastructure needed to support deterrence in 2015 has been challenging for several reasons. The range of possible threats poses a host of very different requirements for a military capability. The policy community has not yet defined the specific capabilities required to deter the numerous possible adversaries in detail. The course we have taken is to presume as a desirable goal—in fact, as a base case —that the United States sees the world of 2015 and beyond to be that described as Dynamic Cooperation, and that it will have configured its forces and infrastructure for that world. We have then addressed the character of the weapons, operations, and infrastructure to be expected for the world of Dynamic Cooperation in 2015.

Deterrence in 2015 will depend on nuclear and non-nuclear offensive capabilities and active and passive defenses. We have identified the capabilities needed to respond in a timely manner should it be determined that, contrary to expectations, the world is really headed for a world of Nuclear Giants, Global Terror, or Regional Nuclear Tension and Use. We have not tried to predict when perception of a changed threat will materialize, whether before or after 2015. Our objective has been to have, at all times, weapon systems, operational capability, and infrastructure that can respond to an evolving threat faster than that threat can materialize. Robustness in the face of an uncertain future and flexibility in response to changing threats and policy requirements are essential.

Ironically, the political climate of a world of Dynamic Cooperation probably provides the greatest challenges for weapons, operations, and infrastructure. In the face of the manifest threats of the worlds of Nuclear Giants, Global Terror, or Regional Nuclear Tension and Use, resources for an adequate military capability are likely to be easier to obtain. In the relatively benign world of Dynamic Cooperation, the pressures to reduce expenditures for weaponry and to reduce numbers of weapons will be severe. The pressures to reduce expenditures for an infrastructure needed to be prepared for a then non-existent threat will be even greater.

Nuclear Weapons in Assuring, Dissuading, Deterring, Defending, and Defeating

Weapons, operations, and infrastructure have a direct impact on whether the world continues as one of Dynamic Cooperation or becomes increasingly dangerous. They can have the direct effect of assuring our friends and allies that we have the ability to defend them. At the same time, they are capable of dissuading possible adversaries from even attempting to obtain hostile capabilities. They can deter the use of force by those who have hostile intent, can defend us if attacked, and defeat if all else fails. To the extent that these tools assure and dissuade, they contribute to creating a less-armed world. To the extent they deter, they contribute to a more peaceful world. By being able to defend and defeat, these tools limit damage to the United States and its allies when attacked.

To assure, dissuade, deter, defend, and defeat, weapons, operations, and infrastructure must be credible and be seen as credible to fulfill all their missions and thereby shape the future we want.

Weapons must be demonstrably capable of controlled damage. Operational readiness must be made clear with visible exercises and training. Infrastructure—defined as the factories that can produce hardware as well as the people and research and development facilities needed to maintain what exists and create what may be needed—must be perceived as capable of maintaining existing hardware and ready to produce new capabilities in response to any threat faster than that threat can be mounted. However, weapons, operations, and infrastructure are only tools, and it is up to the decision-makers to exercise these tools to achieve political and military objectives.

Operations and Intelligence

In the following, two very important subjects are given less treatment than they deserve: operations and intelligence. Operational readiness is a *sine qua non* of assurance, dissuasion, deterrence, defense, and defeat. It is by our operational capability that we demonstrate the reality of our hardware and thus give it credibility. Without operations, there is nothing. As we train is how we're going to fight. In what will follow, for every bit of technology, for every bit of the infrastructure, it is fundamental that unless it's exercised, it does not contribute to assurance, dissuasion, deterrence, defense, or the ability to defeat. Only through the true exercise of these capabilities will anybody know that they exist and that we trust their capabilities. Thus, only through exercise will others give them any credibility.

Superior—even exquisite—intelligence underlies all expectations for future conventional capabilities and is critical to the future nuclear options we discuss. Precise knowledge of what is important to the elites of hostile nations, as well as precise knowledge of the location of facilities and people whose destruction would eliminate the hostile capabilities of a regime, is critical to the ability to deter and destroy. The U.S. objective has not been to make war on captive populations but to punish those responsible for hostile acts. Precision delivery of weapons makes implementation of the policy achievable, but *only* if the targets can be located precisely in space and time. Despite the lack of further discussion in what follows, there should be no doubt that intelligence is fundamental to the success of assurance, dissuasion, deterrence, defense, and the ability to defeat.

The Tools for Deterrence

In 2015, deterrence will depend on nuclear and non-nuclear offensive capabilities and active and passive defenses. We can expect significant improvements in ballistic missile defenses and homeland defense. We can expect further enhancements in conventional weapon systems, beyond the impressive performance we saw in Iraq, Kosovo, and Afghanistan. As impressive as these capabilities may become by 2015, their impact on the requirements for the nuclear deterrent may not be significant. Precision conventional weapons alone cannot and will not deter the use of weapons of mass destruction (WMD). Ballistic missile defenses in 2015 will not diminish the numerical requirements for offensive forces.

Non-Nuclear Forces

A precision conventional-weapons capability in 2015 constitutes our primary deterrent against conventional conflict. Our conventional strength will assure, dissuade, deter, defend, and pose the threat of defeat to any who would challenge us and our allies on the battlefield. If our interests are attacked with conventional weapons, our conventional forces will destroy and defeat the challenger. We can expect that challengers will have observed our conventional strength and some will have concluded—as Iraq, North Korea, and others apparently have—that chemical, biological, and nuclear weapons may better enable them to deter or defeat the United States.

The conventional weapons of the United States alone cannot deter an adversary's use of WMD. Unless the WMD strike is out of the blue, its use would follow a period of conventional warfare in which it should be assumed that the United States has done everything possible to achieve victory using conventional forces. The opponent, whom we would try to deter from the use of WMD, has already suffered whatever damage conventional weapons can deliver. There would be no additional conventional punishment left to impose upon him. In an intra-war situation, non-nuclear weapons offer no new punishment for subsequent WMD use.

Historically, nuclear deterrence has been successful because it poses the prospect of swift, sure, lasting destruction. The lack of reliability that will be demonstrated in the use of non-nuclear weapons during any conventional conflict will undermine the credibility of swift, sure conventional weapon destruction in response to WMD use. The demonstrated loss of effectiveness in

non-nuclear weapons with even the smallest perturbation in accuracy will undermine the credibility of swift, sure conventional destruction. Finally, the rapid recovery from non-nuclear damage in previous conflicts will undermine the deterrent threat of lasting destruction.

Defenses

By 2015, ballistic missile defenses, including both national missile defense and theater defenses, will contribute to deterrence. Active defenses will contribute to our ability to assure, dissuade, deter, and defend. Theater defenses will assure some allies that they will be protected in alliance operations with us. They also will discourage some nations from trying to acquire ballistic-missile capabilities that might threaten us. They will deter some that have limited ballistic-missile capabilities from using them, and they will indeed reduce damage in the event an attack is launched. Defensive capabilities, however, will not diminish the needed numbers or kinds of U.S. nuclear forces. Active defenses in 2015 will not exist in sufficient numbers or capability to deter massive attack.

While defenses may protect against small-scale missile attacks, they will not be able to defend against a host of scenarios, including attacks with hundreds or thousands of weapons, battlefield delivery of WMD using cruise missiles or other means that would defeat defenses, or terrorist uses. Neither national missile defense, nor theater defenses, will be robust enough in 2015 to affect the calculation of the number and kind of nuclear forces needed for deterrence to work.

Nuclear Weapons

Having addressed the limitations of non-nuclear weapons and ballistic missile defenses, it is useful to define the missions that uniquely will be the domain of nuclear weapons in 2015. Nuclear weapons will continue to be required to deter nuclear attack against the continental United States. Nuclear weapons will continue to threaten significant penalties for an attributed attack against the United States and its allies with chemical, biological, or nuclear weapons. And, although the likelihood of a large-scale conventional attack against the United States and its interests may be small, nuclear weapons will continue to retain the capability to deter such threats. In addition to the deterrence roles, nuclear weapons will be the awesome response to any massive nuclear attack against the United States and its allies. Nuclear weapons will for some time remain the only option for the destruction of certain unique targets.

To accomplish these objectives, the nuclear weapons of 2015 must be seen as credible and operationally ready for both massive use and limited applications. Importantly, the Departments of Defense (DoD) and Energy's (DOE) infrastructure must be, and must be seen to be, capable of responding to new threats.

Current Projections of Nuclear Capabilities and Preparedness in 2015

Weapon Systems

What nuclear forces will be available in 2015 to perform these important missions for the United States and how will they differ from today if current plans are implemented? The answer is that today's planning assumption is that the forces of 2015 will be the forces of today. This answer should be of concern to all. These weapon systems will be 30, 40, and 50 years old. Follow-on systems will not be in place. The follow-on systems, if they exist, will be a long way from reality even in 2015. The weapon systems of the United States will be the oldest weapon systems among the five nuclear powers. Will the world take seriously a deterrent that has not been modernized or even tested for decades?

Figures 3-1 through 3-4 describe the plans as they exist in mid-2001. The recent Nuclear Posture Review has not resulted in significant changes, but has noted that the block obsolescence of the nuclear forces should be studied. If we focus on 2015, we find that the naval strategic capability will still be Trident **(Figure 3-1)**. The initiation of a follow-on ballistic missile submarine begins after 2015. Trident is planned to be in the force until some time after 2025. Thus, as far as the sea leg of our strategic forces is concerned, in 2015 we will have the same capabilities we have today, although fewer in numbers.

Turning to our ICBM force **(Figure 3-2),** Peacekeeper disappears, and Minuteman III will be maintained until the end of its service life of 2020 or later. Thinking about a follow-on ICBM may be initiated in 2003–2004, but even then, it would not be available until 2020 at the earliest. So, with respect to the land-based missile part of the deterrent, what we will have in 2015 is what we have today, except fewer systems and fewer numbers.

The air-borne leg of the strategic triad—the bombers, the B52 and

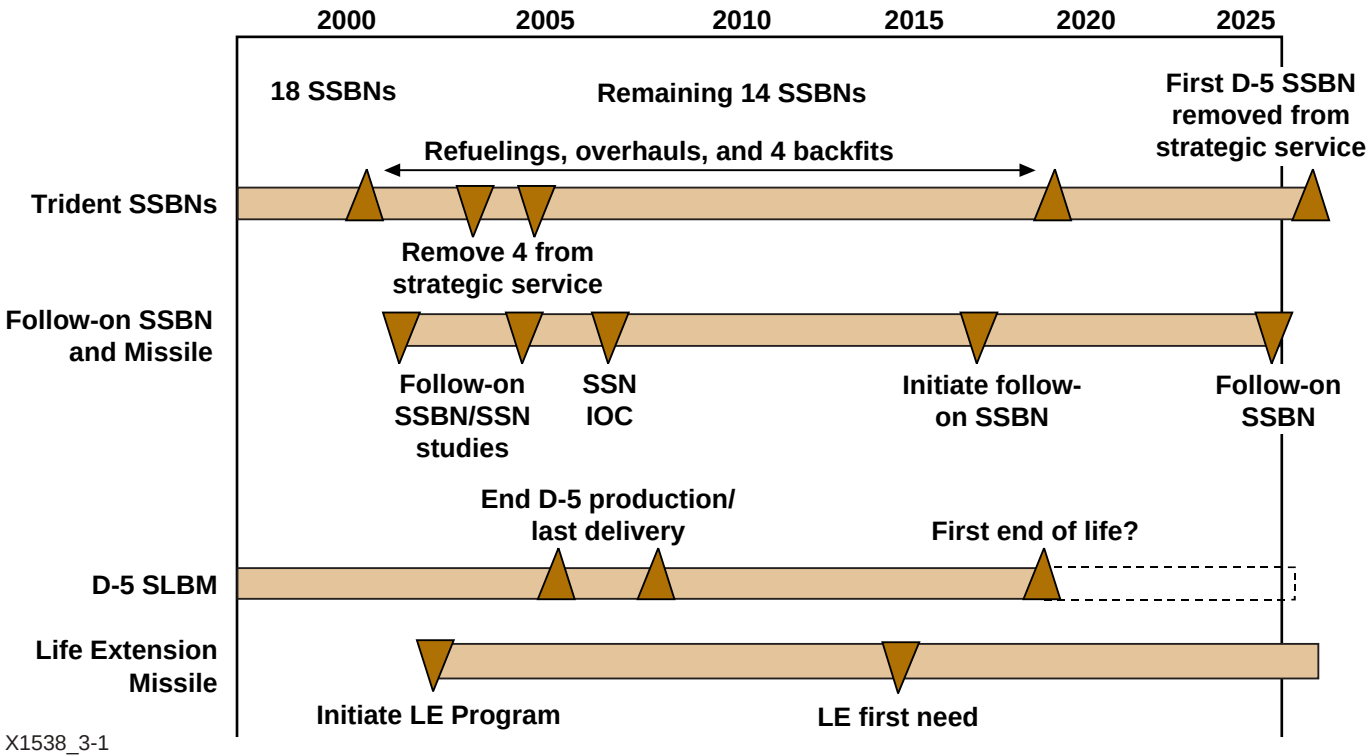


Figure 3-1. Planning for naval strategic systems, 2000–2025.

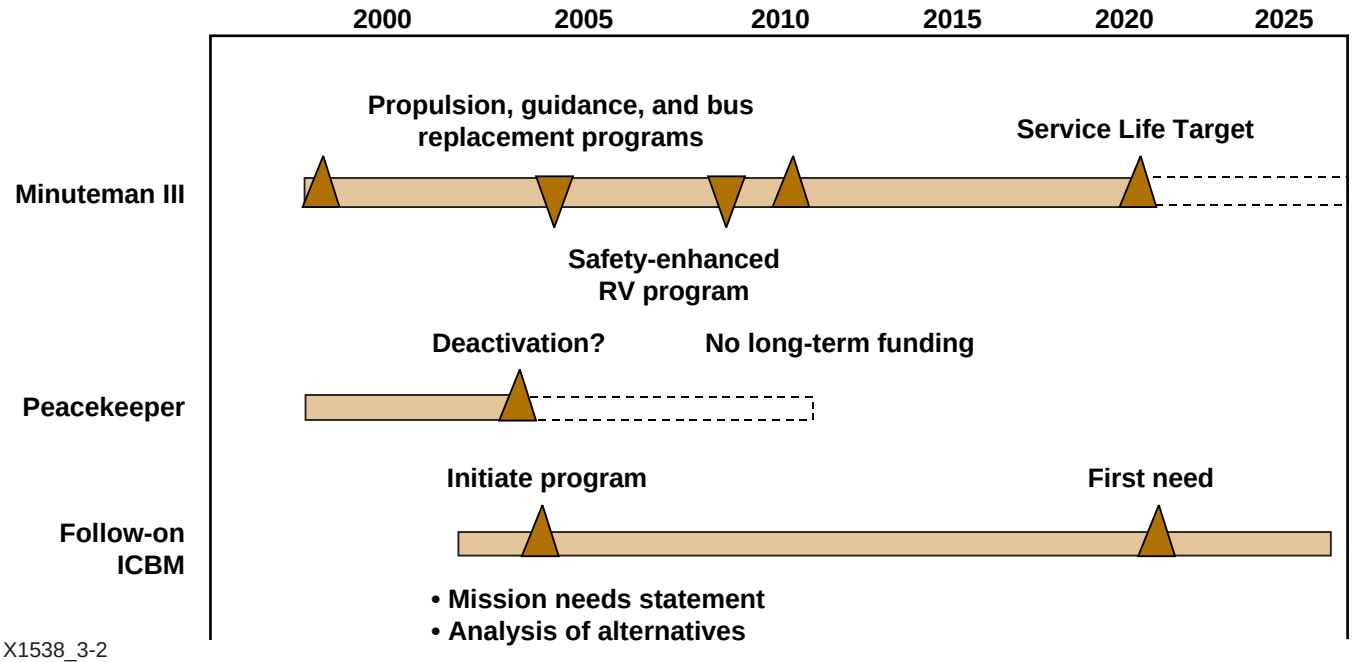


Figure 3-2. Planning for land-based strategic systems, 2000–2025.

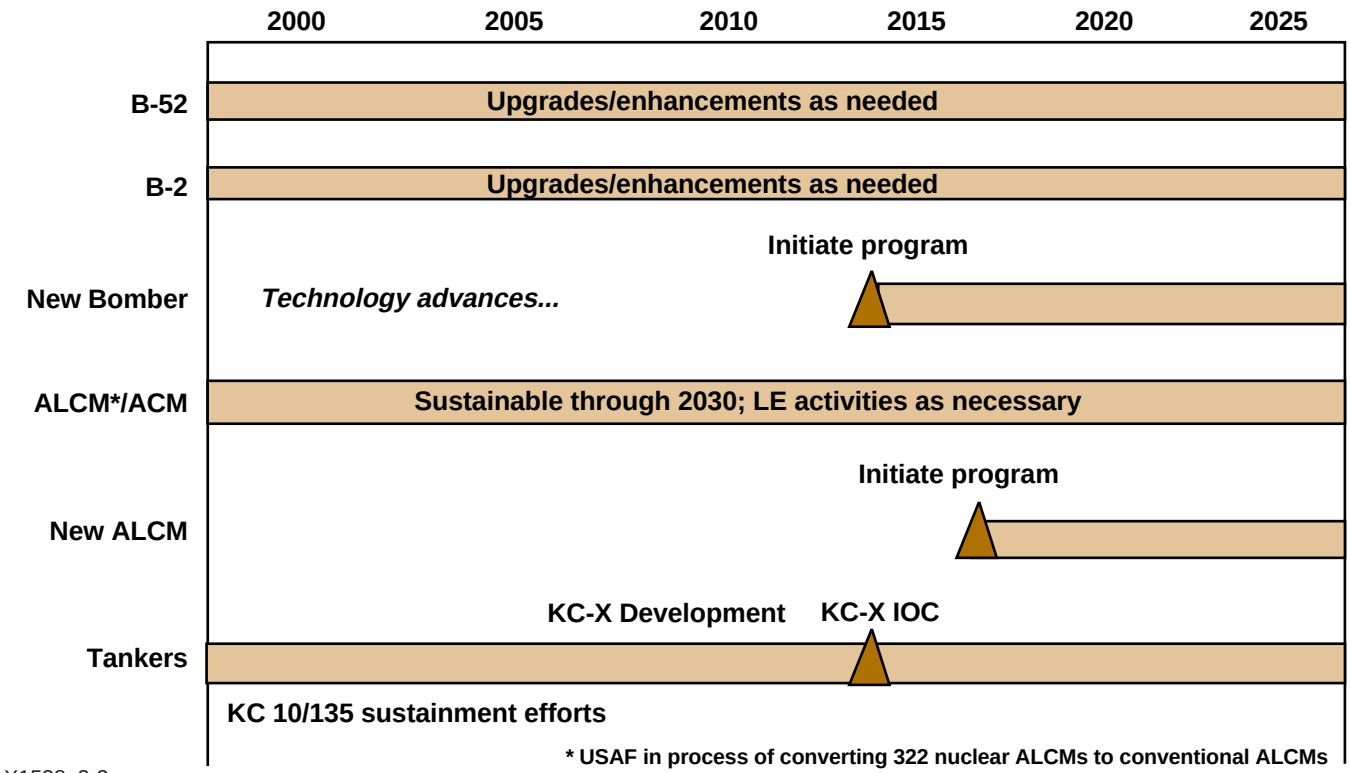


Figure 3-3. Planning for air-borne strategic systems, 2000–2025.

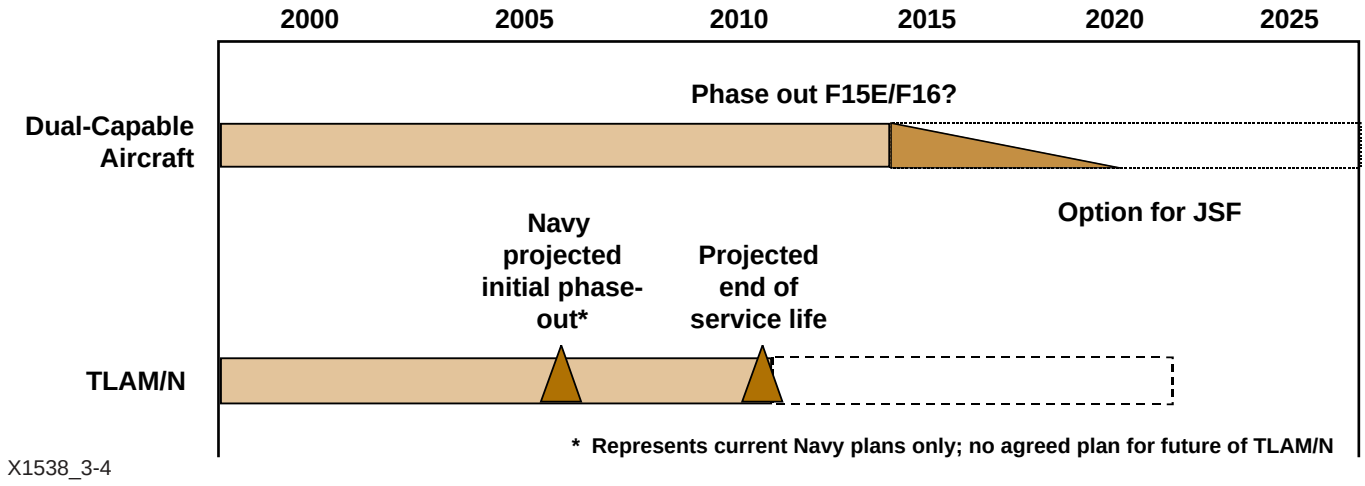


Figure 3-4. Planning for non-strategic systems, 2000–2025.

the B2 **(Figure 3-3)**—are expected to be operational beyond 2025. If there is going to be a new bomber, a program might be initiated around 2014, but it won't be ready for a long time after that. The air-launched cruise missile (ALCM) and the advanced cruise missile (ACM) also are expected to be in the force for the foreseeable future. A new ALCM may be considered around 2016. All these capabilities may have subsystems modernized by life-extension programs along the way, but the basic systems remain unchanged. Again, what we get in 2015 is what we have today, but in reduced numbers.

That brings us to the so-called non-strategic systems **(Figure 3-4)**. The dual-capable aircraft in the inventory are the F15 and F16. Both are phased out in 2015. The only replacement in sight is the Joint Strike Fighter. However, it has not been firmly decided whether it will have nuclear capabilities. And as far as the Tomahawk Land-Attack Missile/Nuclear (TLAM/N) is concerned, its projected end of service life is well before 2015, and it could disappear much earlier.

What conclusion can we come to after reviewing the preceding information? For nuclear weapons to fulfill their roles, they must be seen as credible and operationally ready. What is the credibility to those we wish to deter—even in the world of Dynamic Cooperation—of a strategic force in which the youngest element was designed 30 to 50 years previously, to which we have paid so little attention, and which we have not modernized in any significant way?

The Department of Defense's Infrastructure

Turning from forces to the DoD's infrastructure, is the infrastructure any healthier? If we should discover that the world is headed toward one of the more dangerous postulated options, rather than Dynamic Cooperation, how can we increase our capability when the production lines that built the existing forces have been shut down for many years? Plans for sustaining adequate infrastructure are not in place in the DoD. With respect to the DoD, the Nuclear Mission Management Plan (NMMP) describes today's capabilities but doesn't address the preservation of the assets needed to replace today's capabilities.

The NMMP does identify several technologies unique to the nuclear mission and some technology programs designed to preserve those capabilities. It's been a fiscal struggle to keep these programs fully funded, a struggle likely to continue into the future.

Modest study efforts to examine infrastructure requirements in the DoD have been initiated with the Center for Strategic and International Studies (CSIS), Systems Planning and Analysis, Inc. (SPA), and Scientific Applications International Corporation (SAIC). While these are good initial efforts, the subject is serious enough that it should be the subject of a major *internal* DoD effort. The DoD commitment has not been what it should be.

Nuclear Warheads

Turning to the Department of Energy, a plan looking out to 2015 exists. The Stockpile Stewardship Program has been designed and is doing a good job, although not as good a job as it could have done if it had been better funded. However, its focus is the preservation of existing hardware. Everything previously said about nuclear-weapon delivery systems is just as true about the nuclear weapons themselves. The DOE's effort is focused on making sure that old weapons (30–40 years old) and older weapons are still operational in 2015. Again, the question must be asked: if a nuclear deterrent is dependent on ever-older weapons, can it be viewed as credible? And will life-extension programs, designed to replace weapon components before they no longer work, keep the weapons young and healthy enough?

Department of Energy's Infrastructure

DOE's infrastructure is in extraordinarily poor condition. The Foster Panel, established by the Congress to review the administration's certification of the nuclear stockpile, has expressed concern that the erosion of human and capital assets is undermining DOE's ability to sustain even the current stockpile, let alone respond to new threats. The production plants, needed to replicate old weapons and essential for construction of any new designs, continue to deteriorate. The life-extension programs continue to fail to meet milestones. The Nuclear Test Readiness Program isn't "ready"; there's talk now of trying to shorten the time between the decision to test and the time of actual test from three years to 18 months. In fact, this shortening of time was a recommendation of the Foster Panel. The ability of the DOE complex to respond to new weapon requirements is questionable, largely because there are no exploratory development programs underway that test and exercise those capabilities for design, engineering, and production. In this latter regard, lack of DoD support for exploratory development is a major contributor to the DOE's failure.

Nuclear Preparedness for 2015

The conclusion must be that even for a world of Dynamic Cooperation, the plan for the nuclear deterrent in 2015 is a dubious one. Deterrence is questionable because of continued dependence on increasingly old weapons and weapon systems. The planned-for infrastructure will have difficulty meeting the needs of even the planned smaller number of weapon systems and weapons, let alone be robust enough to respond rapidly if a significant change in the threat is perceived.

How Can We Be Responsive to a Changing Threat?

What are the key ingredients for being prepared to respond to a major change in the perceived threat, a change to a world other than Dynamic Cooperation, in 2015 and beyond? The first, of course, is to fix the problems already identified so that the nuclear component of the deterrent, even if it must depend on decades-old hardware, is healthy in 2015. Four additional ingredients are key to ensuring the robustness and flexibility for responding to threats. They are improved conventional capability, new nuclear-weapon capabilities, hedging for uncertainty, and dual-capable weapon systems.

Improved Conventional Capabilities

The very good news about deterrence in 2015 is that this country has a very robust, technically exciting, non-nuclear weapons program underway. Improvements are underway in accuracy, command, control, and communications, enhanced lethality, and defense avoidance. Should a major increase in threat be perceived, hot production lines will be in place. Among the concepts under study are long-range delivery systems to avoid the need for the local basing of weapon systems; supersonic delivery vehicles; two-way communications so weapons can be re-targeted in flight; delivery vehicles that can loiter for long periods near potential targets awaiting command target decisions; collective intelligence and strike operations on the same launch platform; guidance systems coupling precision Global Positioning Satellites (GPSs) with inertial systems and imaging systems; and the ability of the delivery system to continuously assess and respond to countermeasures. And, in addition to all this is the reality of information warfare capabilities.

A specific example of the integration of many of these technologies is the Tactical Tomahawk, the 2003 version of the Navy's land-attack missile. Its range is going to be 1,600 miles. The missile can be re-targeted in flight. It will loiter over the battlefield and respond to emerging targets. An on-board camera with a satellite link will scan the battlefield for targets and assess battle damage. Its accuracy will derive from Terrain Contour Matching (TERCOM), Digital Scene-Matching Area Correlation (DSMAC), and GPS guidance.

All of the work on non-nuclear weapon systems is augmented by the continuing search for exquisite intelligence motivated by the idea that, for the first time, weapon systems will exist that can take advantage of real-time target location.

The aggressive programs in all of these areas are in stark contrast to the fact that there are no new programs in the nuclear-weapons area. Later, we examine how we may retain credibility in the nuclear deterrent by taking advantage of the outstanding work being done for non-nuclear weapon systems.

If there is one gap in the picture for non-nuclear weapon systems, it is the failure to seriously consider the consequences of the use of nuclear weapons. Initial nuclear-weapon use is likely to be by the adversary. We need to understand the consequences to subsequent operations of the exposure of non-nuclear weapon systems to nuclear-weapons effects.

Nuclear survivability can be achieved by hardening against nuclear effects or by writing off the exposed hardware and replacing it. (The latter could be extremely expensive not only in terms of monetary cost, but also in lives and time lost.) Those responsible for the tremendous achievements in non-nuclear weaponry would be well advised to consider the survivability of operations when nuclear weapons are used by an adversary or by the United States.

An increasingly important aspect of modern non-nuclear capability is its "expeditionary" nature. As was very evident in the Afghanistan conflict, we must not depend on regional bases in the conduct of operations. Strike operations are conducted from the sea or from the continental United States. By 2015, we should be looking at systems with ever-longer stand-off ranges. Trans-continental cruise and supersonic cruise missiles should become part of our delivery capability. When we do find we can operate from allied bases, our operations will be greatly facilitated if our allies already have experience with—and even operate—the same delivery systems.

Nuclear Capability and Hedging

As nuclear forces are reduced in anticipation that the world of the future is one of Dynamic Cooperation, hedging for uncertainty will require planning and the commitment of fiscal sources. What actions will be required to respond if instead of Dynamic Cooperation, we find ourselves headed for the world of Nuclear Giants, Global Terror, or Regional Nuclear Tension and Use? The worst mistake that can be made is to assume that the restoration of capability will be easy or free.

As already emphasized, the nuclear infrastructures of the Departments of Defense and Energy must be fixed. Careful planning will be a prerequisite. Every effort should be spent looking for fiscally responsible solutions. In that regard, DOE should once again examine the cost savings that should accrue from shrinking the production footprint by consolidating production activities to a smaller number of sites.

In the near term, hedging for future uncertainty means planning and exercising for the reconstitution of retired assets, including both the weapon-delivery systems and the nuclear warheads. Retired weapons and weapon systems must be preserved in a way that will allow them to be redeployed in the face of newly perceived threats. This is of paramount importance for the nuclear weapons because the United States will not have the ability to produce nuclear weapons for many years to come. The same is true for many parts of existing nuclear-weapon delivery systems because their production lines in many cases have been shut down for some time. It also must be recognized that reconstitution will be impossible unless we ensure the continuing availability of the knowledgeable people and the facilities that do exist currently.

In the longer term, the reconstitution of retired assets no longer makes sense. The cost of maintaining retired assets will become prohibitive. More importantly, the effects of age will render the reliability of the performance of retired systems dubious. The competence of the personnel required to restore retired assets to operability will themselves become questionable. Our objective should be one of reestablishing nuclear "capability," not of relying on old assets. Plans need to be in place to make use of state-of-the-art hardware (including nuclear capability) in response to a perceived change in threat.

One approach is to begin development of some new, dedicated nuclear-delivery systems as soon as possible, recognizing that it may be a decade before new hardware can actually be deployed. This will shorten the time when we must depend on the hope of restoring aged, mothballed systems in the face of new threats. Additionally, the development activities will underscore to allies and potentially hostile powers that we take deterrence seriously. Another approach that may offer reduced time and cost is planning for dual-use of non-nuclear systems. This subject will be expanded upon at length later.

New Nuclear-Weapon Options

We have discussed the technical options available in the realm of non-nuclear weapons. Because deterrence in 2015 will require new non-nuclear weapon capabilities against new threats, there are ongoing programs to assure that the United States has the best possible non-nuclear forces in 2015. In stark contrast, there is literally a suppression of thinking about what new nuclear capabilities may be needed to assure a credible nuclear-weapon component of the deterrent in 2015.

Options exist for nuclear-weapon design that could reduce collateral damage and enhance deterrence. New nuclear-weapon designs could eliminate the impression that we might be self-deterred from a nuclear-weapons response to attacks by WMD. New nuclear designs may be the only way to defeat certain classes of targets. An aggressive effort should be undertaken to evaluate all potential nuclear-weapon options in specific scenarios that may be of interest. Publicizing nuclear-weapon programs whose objectives are to reduce collateral damage will enhance deterrence.

For these efforts to proceed, it is imperative that legal restrictions on the study of new nuclear-weapon designs be removed. Most specifically, the Defense Authorization Bill for FY94 forbids the study of weapons whose yield is less than five kilotons. It is not a matter ofiprohibition of construction; it is a prohibition on engineering and design. Until that prohibition is eliminated, there is no way to even evaluate the utility of the collateral damage reduction of which modern warheads are capable. The full support of Congress must be obtained to ensure the funding for the necessary exploratory development programs and to eliminate the onerous limitation on the study of new designs.

Exploratory development programs to evaluate objectively new

nuclear-weapon options would let us determine which offer the best enhancement of deterrence. Visible and continuous re-assessment of stockpile adequacy is fundamental to a credible deterrent. In one area, the study of weapons needed to destroy hard and deeply buried targets is already underway. Nuclear weapons offer unique capabilities in two ways important to national missile defense. Very-low-yield nuclear weapons can kill incoming warheads with much higher confidence than can be attributed to conventional weapons. If incoming warheads contain biological weapons, interceptors with low-yield nuclear weapons may be the only means of destroying the biological agents. Nuclear weapons also may offer the only means of destroying biological agents—not simply dispersing the agents—in any attack against stockpiled biological weapons. The improved accuracy currently available in many existing non-nuclear systems, if provided to nuclear delivery systems, would permit significant yield reductions and thereby potentially reduce collateral damage. In virtually all of these areas, study is now restricted by legislative constraints, as mentioned above. The removal of these legal restrictions is *essential* for the study of new designs.

While improved accuracy means that lower yields of standard nuclear-weapon designs can be effective with the concomitant reduction in collateral damage, weapon technologies offer inherent reductions in collateral damage. Designs offer a possibility of reduced fallout compared with the same yield of a standard design, so-called Reduced Residual Radiation (RRR) weapons. Furthermore, Enhanced-Radiation (ER) designs offer improved effectiveness with reduced collateral damage against manpower-intensive military targets. Three specific examples help explain what these technologies might offer. These examples are provided to encourage joint examination by the Departments of Defense and Energy in specific scenarios of interest to them.

First, **Figure 3-5** compares the effectiveness against hostile troops of a a standard fission (FISS) weapon with a theoretical enhanced radiation (TER) weapon: 10 kilotons of standard fission versus 1 kiloton of enhanced radiation. In this scenario, radiation is the effective defeat mechanism. Both weapons expose the same area of troop concentration to a militarily significant dose of 150 rads of radiation (red in the figure). However, the radii of blast (orange) and thermal damage (yellow) for the FISS weapon are substantially larger than the militarily effective radius; for the TER weapon, the radii are smaller. Equal military effectiveness is achieved by the TER weapon, but with much less collateral damage. Further study is needed to determine whether the reduction is enough to make enhanced radiation weapons a worthwhile component of the nuclear stockpile of 2015.

Next, **Figure 3-6** compares the effects of a hypothetical reduced residual radiation (RRR) weapon, a device that has much less fissile material than the standard fission device, with the effects of a FISS weapon. The 25-kiloton RRR weapon's fallout contour for less than 0.4 rad (shown in dark green), which is comparable to the typical annual dose on the surface of the earth, is less in size than the 5-rad contour (shown in yellow) for the FISS weapon. Consideration should be given to determine whether a weapon with such reduced fallout makes it usable politically and

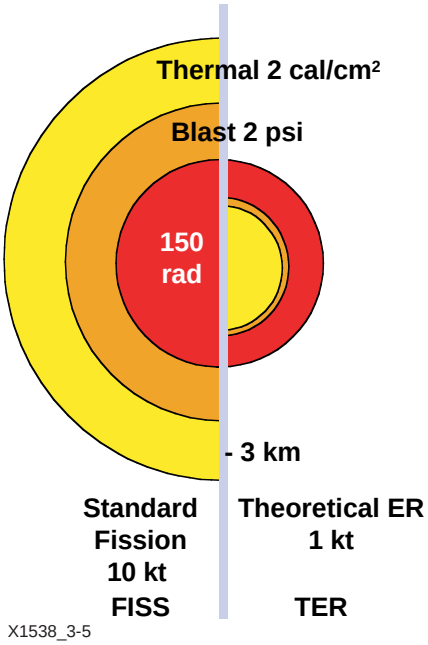


Figure 3-5. Comparison of the effects of a fission weapon (FISS) with a theoretical enhanced-radiation (TER) weapon.

militarily. Can the larger RRR weapon be packaged in appropriate delivery vehicles? These issues are worthy of further study.

A third example **(Figure 3-7)** addresses the scenario of an attack on a biological weapon storage facility. The stored weapons contain anthrax. To kill anthrax by radiation requires a megarad—a million rads of radiation. We compare three devices: a FISS weapon, a RRR weapon, and a TER weapon. Each produces the same lethal dose for anthrax throughout the storage facility. However, to achieve the same effect, the weapons have different yields and generate different levels and patterns of fallout. The TER weapon is slightly better than the RRR one in terms of reduced collateral damage. The FISS weapon produces much more extensive collateral damage. For a facility very distant from populated areas, the differences may not be significant.

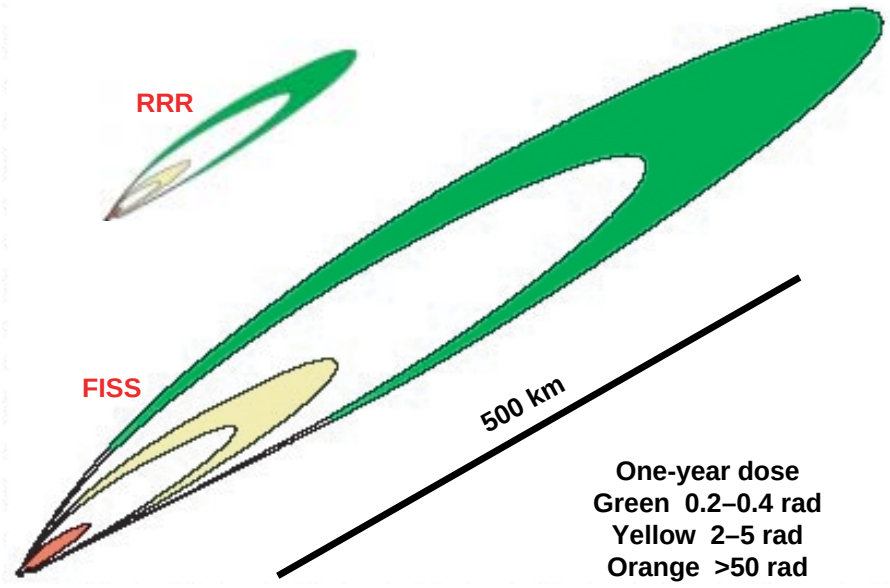


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Figure 3-6. Comparison of a theoretical reduced-residual radiation (RRR) weapon and a fission (FISS) weapon.

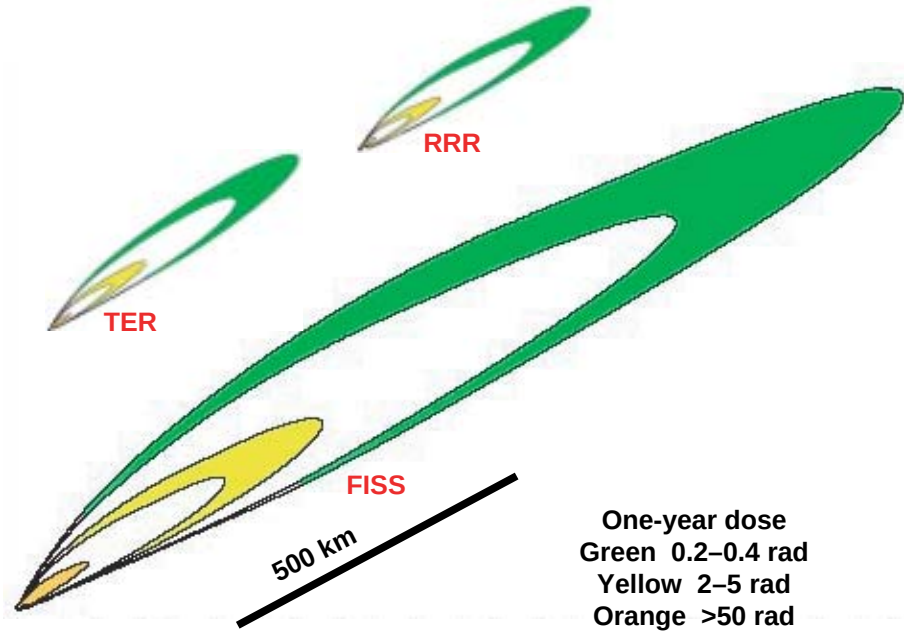

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Figure 3-7. Comparison of theoretical enhanced-radiation (TER), reduced residual radiation (RRR), and fission (FISS) weapons in attacking an anthrax storage location.

However, for a facility near a population or near the border of a friendly state, the difference may be very important. The trade-offs should be examined.

Improvements in areas other than the destructive capability of nuclear weapons should also be examined. The Departments of Defense and Energy should examine possible improvements in nuclear-weapon system controls. It remains critically important that nuclear weapons can only be detonated at the time intended and the place targeted. Technology today offers the possibility of assuring that a weapon can only be armed in the closest proximity to its target. Modern technology offers the potential for wireless arming. At the same time, modern technologies ought to be explored to ensure that for the sake of safety, a weapon is incapable of producing any yield unless it is on its target.

As these different options are examined, it will be very important to understand which will be denied by the current nuclear-test moratorium. It may be that very important capabilities will be denied unless nuclear testing is resumed. The nuclear-design community must determine whether designs can be developed without nuclear testing that do the job well enough and whether the reduced reliability of such weapons would be acceptable.

Dual-Capable Weapons

Dual-capable systems—delivery systems that can carry either a non-nuclear or a nuclear warhead—offer the possibility of low-cost, state-of-the-art nuclear capabilities. Two options present themselves. Additional numbers of conventional delivery platforms can be produced for the purpose of carrying nuclear weapons. Or conventional warheads can be removed from deployed conventional systems and replaced with a nuclear weapon. The pursuit of dual-capable systems offers the possibility for a lower-cost nuclear deterrent in 2015. It also promises lower costs for the preservation of the ability to respond rapidly in the face of an unanticipated threat.

Using non-nuclear weapon systems for rapid augmentation of the nuclear deterrent, either by converting them or increasing production from open assembly lines, should be faster and cheaper than trying to develop and deploy dedicated nuclear systems or, worse yet, recreating the production lines for the decades-old systems already deployed. The restoration of nuclear capability, even if non-nuclear systems are utilized, will require that the country preserve the competency in people, technology, and facilities unique to the nuclear capability.

The idea of dual-capable delivery systems is not new. At one time, the United States had in its nuclear-weapon stockpile nuclear and conventional artillery shells for its 8-inch guns. Today's F15 and F16 aircraft can deliver conventional or nuclear bombs. Some in the military have opposed dual-capable systems for reasons of cost and additional complexity imposed on conventional operations. In the past, the costs of dual-capability, while lower than the cost of a dedicated nuclear system, were higher for the developer of the conventional system, and dual-capability was often opposed by the conventional system developer. The additional burdens for a nuclear capability were the initial costs for command and control and reliability and the costs associated with the continued certification of those capabilities.

It is possible that technology today offers solutions to many if not all of the historic hurdles. This needs to be studied by the Departments of Defense and Energy working together. Historically, the cost of running nuclear-qualified wires through conventional systems was significant. Today, wireless arming is a possibility. With encrypted arming messages, we can conceive that an arming signal could originate from a control box in the cockpit of an aircraft or from a control box on the desk of the president.

Nuclear-weapon system control is an absolute necessity whether in a dedicated or dual-capable system. There must be positive control so that a nuclear yield is impossible except when demanded. But these functions can be accomplished within the warhead package and need not affect the delivery system. Similarly, the safety and security functions can be managed within the nuclear package. Because the reliability of non-nuclear systems has been lower than previously acceptable for nuclear systems, it may be more likely that a nuclear weapon in a dual-capable system could end up at a point other than where it was intended. High-confidence destruction and disablement options must be created, but modern technology may make them more achievable than was the case in the past.

The area of dual-capable systems is crying out for exploratory development jointly between the Departments of Defense and Energy. The two departments should aggressively examine existing non-nuclear, weapon-delivery systems to see if a nuclear option for the system offers a low-cost way to modernize the nuclear-delivery capability. The Tactical Tomahawk described previously is just one possibility. It should be a requirement that all new conventional systems are thoroughly reviewed to see if a nuclear option could be established. It may even be technologically possible to develop a nuclear-weapons package for future application that can be "plugged into" a conventional system, converting it from conventional to nuclear easily and quickly.

Working Group's Conclusions

Whither Deterrence in 2015? Deterrence will depend on nuclear and non-nuclear weapon systems and active and passive defenses. Operational readiness will be paramount to its credibility. Exquisite intelligence will be essential.

The United States has decided on an aggressive ballistic-missile-defense program. Technological developments over the next decade will determine how capable that defense will be. It is unlikely that defensive capabilities will be robust enough to allow offense/defense trade-offs that would diminish the number or kinds of offensive forces needed. Non-nuclear weaponry will continue to increase in sophistication. Hopefully, the conventional force strength of the United States will be so impressive that it will deter armed aggression against the United States and its allies.

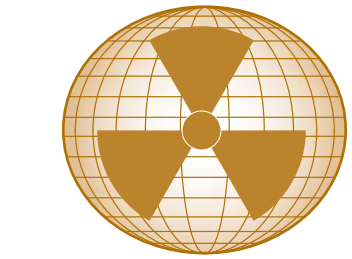
Once armed conflict begins, non-nuclear weaponry cannot deter escalation to WMD by the adversary. The nuclear deterrent must be credible enough to deter such escalation. The nuclear deterrent must also be credible enough to fulfill its historic role of deterring a massive nuclear attack against the United States. In conflicts where WMD's use by an adversary is possible, some nuclear capability may be needed as the only option for the destruction of certain targets.

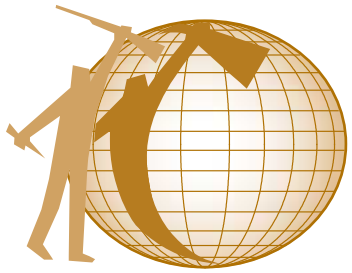
Our study identified a cause for concern regarding the ability of the likely nuclear capability of 2015 to fulfill the above roles. Even assuming the relatively benign world of Dynamic Cooperation, the nuclear forces of the United States will be old and getting older, and we must question if they will be viewed as a

credible deterrent by allies and possible hostile nations. This will be especially true if the United States alone has foresworn modernization. With respect to the ability to respond rapidly to more threatening world prospects (Nuclear Giants, Global Terrorism, Regional Nuclear Tension and Use), the concern focuses on the health and preparedness of the infrastructures of the Departments of Defense and Energy. Neither department has a track record for sustained funding for the critical facilities and technologies that must be preserved if a rapid response is needed. While the retention of retired weapon-system hardware offers a reconstitution capability for the near term, it cannot be sustained for long. New capabilities are needed for 2015. New capabilities are needed to rapidly deploy greater numbers of state-of-the-art systems, should the need arise.

Options do exist to redress all the shortfalls. New nuclear weapons offer the promise of dramatically reduced collateral damage. Dual-capable weapon systems may be cheaper and more quickly deployable should the need arise. They should be aggressively studied. Exploratory development programs are a must. Legislative relief from the prohibition of the study of low-yield nuclear weapons must be achieved if the nuclear deterrent is to benefit from the outstanding accomplishments already in place for the non-nuclear deterrent.

Chapter 4
Roundtable Discussion





On the final day of the conference, a panel of senior officials and experts, chaired by a distinguished public servant, reviewed the findings and conclusions of each working groups. The discussion of that roundtable is captured below, organized with respect to the three working groups: Threats, Scenarios, and Transforming Events; Policy and Diplomacy; and Weapons, Operations, and Infrastructure. Every attempt has been made to capture the entire discussion and the comments have not been attributed.

Threats, Scenarios, and Transforming Events

Responses to the Future Scenarios

The members of the roundtable responded to the different future scenarios postulated by the Threats Working Group. In particular, it was pointed out that the United States must do more than simply identify a favorable world and then put all its efforts into avoiding or preparing for the worst scenarios. It must be pro-active in instituting those policies and taking those actions that would direct it toward a favorable future. In fact, the very scenarios illustrated could themselves be altered by the choices of the United States. The United States is the lone superpower and the choices it makes will affect the other powers. Whether or not we will confront China, whether we continue to take a strong stand against terrorism, what our nuclear posture will be, and so on, will all be important to the future. However, one participant questioned whether the United States would change its policies and weapons even if it knew that it was really headed toward one of the postulated futures.

It was pointed out that the Nuclear Giants scenario is not simply the Cold War revisited. There are some important differences. The Cold War was marked by ideological conflict and states' boundaries that, after the Korean War, were largely static and unchallenged. This is not the case today—boundaries are not static and not agreed on, and this makes for a more dangerous world. There are many uncertainties, such as the expansion of NATO, Taiwan, and Central Asia. Strategic agreements could help manage this situation, but this would imply limits on where forces can go. This participant did not believe that the United States is ready to accept such limits on its forces.

Some participants provided additional possibilities for the future. A particularly common theme was that of Russia becoming Westernized like Europe. Another was a Russia–China armed conflict. A number of participants agreed that Russia appears to have cast its lot with the West, primarily for economic reasons, citing that Putin is moving in that direction. Such movement should lessen the probability of the Nuclear Giants scenario.

It was pointed out that China is also moving toward the West and wants to move further in this direction. It appears that the top leadership in China may be divided on this, but it seems clear that this is the direction in which much of China wants to go and is already moving toward in very tangible ways.

Relations with Russia and China

The view was expressed that economic forces are responsible for these moves toward the West. The U.S. economic power is formidable,

and Russia and China have been drawn into the web of globalization. At present, economic power is probably a more important tool of the United States than is its military power. Nevertheless, it was also emphasized that a new strategic relationship between the United States and Russia is important. However, it is essential to understand this relationship from the Russian and Chinese points of view. Each country has its own list of needs and requirements. Among other things, Russia will be interested in NATO expansion and recapturing the alliance in the Near East. It will also be important to have a strategic dialog with China—it is difficult but not impossible, and the United States can expect some good results, as recent history has borne out, i.e., from President Nixon up through Secretary of Defense Perry.

One participant responded that we want to move toward a non-adversarial relation with Russia and China, but we have not yet defined what it means to have such a relationship in practice. How we define this will influence how much we are prepared to open up our thinking, our commands, and our posture regarding nuclear weapons to other countries.

Middle East Conflict

Strong sentiment was expressed that a future scenario of continuing conflict between Israel and the Arab world, possibly leading to nuclear war, was as credible as any of the other scenarios presented. In 15 years, it is likely that an Arab country will have nuclear weapons. Although Netanyahu has expressed that no Arab leader would risk committing suicide by using WMD against Israel, we see many suicide bombers today. The United States needs to take seriously the potential for a suicide bomber to smuggle a nuclear weapon into Israel.

It was suggested that the United States must be careful to be seen as consistent when dissuading the use of WMD. The report of the Threats Working Group stressed assuring our allies, mentioning Japan, Korea, and Israel, and dissuading use of WMD, mentioning India and Pakistan, but not Israel. We need to be consistent and avoid giving the impression that use of nuclear weapons by a close friend is acceptable, but not acceptable by anybody else. Such a posture would not be credible for nonproliferation and raises the issue of whether we are realistically facing the situation in the Middle East. Hence, we need to give this situation more serious discussion and visibility.

Global Terrorism

The roundtable participants were encouraged to address global terrorism and how to deter it. One participant responded that attempting to deter terrorists by taking action against their families would probably not work. A better way to "deter" would be to find ways to de-legitimize the terrorists within the relevant community, e.g., within the Islamic community. The idea is to not make them be seen as heroes in their community. Another added that terrorism would fail if there were no large popular base for it. If this were to happen, then states that provide "left-hand" support to terrorist groups will no longer feel obligated to support them. If this doesn't happen, then the future scenario of Global Terrorism is a real possibility, possibly leading to war and large-scale conflict.

One participant expressed the view that if we are still coping with terrorist attacks on the United States in 2015, then it will not be an incidental part of a movement, but rather a consequence of a major revolution, presumably Islamic, going on in the world. This would involve major wars, including long wars between coalitions of states. The problem we will have to cope with then will be much more serious than dealing with today's suicide bomber. It could likely lead to a future reflected in the Regional Nuclear Tension and Use scenario.

Another view was that failed states are a breeding ground for terrorism and a significant contributor to the Global Terrorism scenario. These states are much more than just an unpleasant element of the post-modern world. They must be viewed as a strategic challenge for the United States and other nations.

It was stressed that we need a different approach in thinking about deterring terrorists. It will never work if we attempt to go after them, one terrorist at a time, or even country by country. Our approach should be that of "draining the pond," joining together with other allies and going after the broad financial networks and other institutions that support and nourish terrorism, making it unprofitable and unrewarding to run these ponds. It was then pointed out that three elements appear to contribute to deterring terrorists. One is "draining the pond," as previously suggested; a second is improving our defenses against terrorist acts; and the third is making our military operations effective, not only to contribute to draining the pond, but also to serve as a lesson to others who might be inclined to support terrorism.

A summarizing comment was that it appears that we can apply the metaphor of draining the pond to the other future scenarios we have

postulated. In fact, as we drain one pond, we fill another. In a sense, we've already been through the Nuclear Giants scenario. As we drained that pond, we filled the terrorist pond and stocked it with terrorists. Now we're draining that pond and setting up the exact kind of conflict envisioned by the Regional Nuclear Tension and Use scenario. Therefore, we should be looking very closely at regional conflict as a most likely scenario. We need to consider what it would look like with non-state actors and the potential for terror coming to the United States as a result of regionalism.

One participant pointed out that we must keep in mind that attempting to remove or weaken the capability of terrorists to inflict damage can lead us into some very tricky problems. For example, if Saudi Arabia were covertly providing support for terrorists using proceeds from oil sales, would the United States restrict American motorists to limit the flow of resources to Saudi Arabia? This was countered with an example of how to deal with the Organization of Petroleum-Exporting Countries (OPEC) monopoly on oil in a way that wouldn't hurt American motorists any worse than they are now. For example, the United States could place a graduated excise tax on certain imports to keep the price of oil fixed at, say, $20 to $22 a barrel. This would remove OPEC's threat to cut oil prices, preventing other producers from supplying oil to the United States.

Participants noted that the discussion avoided the most favorable scenario—Dynamic Cooperation—which some felt had a modest probability of occurring. There also was sentiment that we did not go deeply enough into examining how to deter terrorists. They seek WMD not as a means to deter, but as a means to inflict damage.

Policy and Diplomacy

Potential or Actual Use of Nuclear Weapons or Other WMD

One participant noted that the study envisioned the future as an equilibrium situation, composed of one or the other of the four scenarios presented, or some linear combination of them. On the other hand, the study postulated the importance of a hedging strategy, which is recognition of the potential for instability and change. What appears not to be recognized, however, is how everything might change, for example, if a nuclear weapon were actually to be used. Very likely this would change what the equilibrium state would look like after such use, and the study has not addressed this possibility. This needs to be addressed if our view of the next 20 years is going to be realistic.

In response, another participant stressed that the probability of the use of nuclear weapons may be increasing. Although nuclear weapons defined the Cold War period, boundaries were relatively static and nuclear weapons were there essentially to freeze the situation. Now, however, boundaries are more fluid and nuclear weapons may be valued, not so much for maintaining a situation, as for modifying it. This appears to be a much riskier situation, especially in the Regional Nuclear Tension and Use scenario.

The question was then posed "How do we respond if someone else uses a nuclear weapon first?" We may be able to respond with non-nuclear weapons. How decisive that might be is problematic, but it may also be very problematic to respond with nuclear weapons because we may not have the right yields or reliability. Furthermore, what if the United States does not respond? How does the rest of the world read that? Does it read the United States as having the internalized position that we'll never use a nuclear weapon, or does it read the United States as being so strong that it doesn't need to use a nuclear weapon?

In response, it was pointed out that the effect of the first operational use could be argued either way (remember WW II). It might evoke huge revulsion after which it would be very difficult to maintain a nuclear posture, or it could mean rampant proliferation. Whoever makes first use will experience enormous political cost. It is extraordinary to conjecture that there is even a 50% chance that the United States will use nuclear weapons first, because the United States has other options available and enormous reach and diversity of power to deal with intolerable acts. It is unwise and unreal to elevate this to something we would want to do, as it would be to show we are willing to do it.

Nevertheless, we need to address how to quickly terminate a war in which biological weapons have been used, before there is follow-up use. We need to think through new ways and determine what role, if any, there is for nuclear weapons.

Red Lines, Declaratory Statements, and Political Will

One participant stressed that there are examples of the failure of deterrence, not because of the lack of capability or the absence of declared policy, but because of a

failure to make clear what would politically not be allowed to stand. As we look ahead at future risks, it will be more and more important to make the international "red lines" clear. What will the international community not tolerate, for example, with respect to the use of biological weapons or with respect to terrorism? It will be a more promising approach to de-legitimize and punish behavior and use (e.g., use of biological weapons).

However, it was pointed out that the United States would have to support such an approach broadly and consistently. For example, nothing happened when Iraq used poison gas against Iran because the United States was not in favor of the Khomeini regime in Iran. Although the United Nations was ready to take Iran's side in 1980, the United States threatened a veto.

Another participant added that it is important to be prepared to use what we already have and to be credible. The fact that we have thrown the Taliban out of power in Afghanistan has given a big boost to our overall deterrent posture. We have shown that if you get us mad enough, we will do bad things to you.

With respect to declaratory policy, it was pointed out that what we say we will do should be only part of what we discuss. It is important to discuss what we need to do to preclude circumstances where we would be forced to make a bad choice. For example, there has been a lot more interest in the debate about declaratory policy rather than in getting away from heavy reliance on nuclear response to the use of biological weapons. We need to work harder to get out of that trap.

However, it was noted that rather than leaving what we will put up with ambiguous, we should say that we would do whatever it takes. Another participant reinforced the suggestion to make the red lines very, very clear on what we will not tolerate. We need to cultivate a world community that agrees on the red lines. What we choose to do when the line is crossed may be subject to some ambiguity. This participant's favorite ambiguous statement is that the United States reserves the right for the last use of WMD.

Three Critical Problems

One of the participants reminded the roundtable that sometimes actions taken to prevent or react to a particular scenario might actually increase the likelihood that we'll find ourselves in another scenario. He introduced three types of problems that we need to consider: the commitment-trap problem, the chain-reaction problem, and the catalytic-war problem.

The commitment trap can be illustrated as follows. For the sake of deterring the use of biological weapons, the United States might state that it would respond to their use with nuclear weapons. Such a commitment could come from the logic of the results of the Weapons, Operations, and Infrastructure study reported here, or bureaucratic interests, or a presidential slip-up. Such a commitment would increase deterrence, but it would also increase the likelihood for U.S. nuclear-weapon use should deterrence fail. We would then be faced with a new type of world, one in which the first use of a nuclear weapon since WW II is by the United States. This could trigger a number of extremely negative responses, such as an immediate increase in the number of states acquiring nuclear weapons, or—should the United States use a nuclear weapon against a Muslim state—an increase in the number of states and individuals that would support terrorism against the United States.

The chain-reaction problem can be illustrated by considering a possible reaction by China to U.S. Ballistic Missile Defense deployment, i.e., increasing its ICBM force by MIRV'ing or increasing the number of missiles. Although this may not affect U.S. security all that much, it could have a big impact on India's. India could then follow suit, affecting Pakistan's security. Other players in the region could follow, not only increasing the risk of state conflict, but also increasing the risk that a terrorist organization could get its hands on a nuclear weapon or nuclear material.

Finally, catalytic war involves the possibility that State A attempts to initiate a war between the United States and State B by launching a covert attack that we mistake as an attack by State B. Although we have tended not to take this scenario too seriously, there are more possibilities now of this scenario occurring than when our concerns were just on Russia and China. We will have difficulty in attributing biological-weapon attacks, determining the use of cruise missiles and radiological weapons, and discovering unconventional delivery of nuclear weapons unless we become more serious about the intelligence requirements for this scenario. The increase in the number of potential adversaries, including regional actors and even terrorist organizations, makes catalytic war a serious problem for the future.

Several others pointed out that the global spread of terrorism leads to a very unstable world and is likely to lead to serious regional conflicts.

In that context, these three very tough problems become acutely relevant. This is especially true because many nations are now capable of WMD.

Another participant replied that the least bad answer to deal with the commitment trap is to retain our policy of considerable ambiguity. The United States has been committed not to use nuclear weapons against a state that lacks them. But during the Persian Gulf War, we maintained an ambiguous position in this regard. To adopt a policy of no first use against WMD would, in essence, put us in a commitment trap. Regarding the chain-reaction problem, there is China's response to National Missile Defense (NMD). Experts argue whether China is responding to United States NMD or is modernizing its forces independently of our NMD. Whether that will change our approach to NMD, we need to consider that a chain reaction is a possibility but not a certainty. Finally, catalytic war is more serious because it is possible to deliver an attack with an ambiguous source, although it is likely that we will figure out who the attacker is because of the political–strategic context. September 11th is a case in point.

This position was supported by another participant who responded that it is lunatic to say exactly how we will respond. You then create a commitment trap and unnecessary immense public debate. Rather, deterrence needs to make clear what we will not put up with.

The one who posed the three questions stated that he didn't know the probability of what state will use nuclear weapons next, but he believed that if a U.S. president is more committed to deterrence, less explicit about what will not be tolerated, and less ambiguous about what the U.S. response might be, it will increase the probability that nuclear weapons would be used. He stated that some in the present administration want the United States to follow such a path for the sake of deterrence. Finally, regarding the seriousness of the catalytic-war scenario: the weapons labs are playing an important role in detecting weapons on ships, in airplanes, and hidden in other covert ways. Nevertheless, the labs could do even more.

Ballistic Missile Defense

The discussion on Ballistic Missile Defense (BMD) centered on its prospects for success and the possible reactions of Russia and China to U.S. BMD deployments. One participant expressed the opinion that BMD will not work. However, if it does work and it works well, then it will become cheaper to deploy defenses than to deploy additional offensive weapons at the margin. Hence, other states will adopt BMD, especially those that are nuclear-armed, and BMD will become a tool of nuclear competition. This is the chain reaction discussed above.

With respect to missile defense and the chain-reaction problem, one participant took the point of view that we should not conclude that China is modernizing its forces as a result of U.S. BMD. China has always been, and always will be, modernizing. Nevertheless, it is equally false to say that BMD will not influence its modernization. In the past China was more "leisurely" about modernizing, but it is becoming less so now. It needs to modernize because its weapons are old and unreliable, and because there is a lot of available new technology. China has been modernizing its theater forces more robustly than its intercontinental forces. It has increased the number of its weapons dramatically. As China comes to forks in the road, it will have to make programmatic decisions, and the foreign-threat environment will shape its choices.

A third participant said that defining a non-adversarial relationship with Russia and China will in practice influence how far we go with defenses and how we do defenses cooperatively with Russia, and conceivably with China and other countries.

Arms Control and Treaties

One participant addressed the changing nature of arms control and the need to strike a balance in what and how we change. It is incoherent to keep every treaty we ever negotiated without any change whatsoever. Likewise, it is equally incoherent to trash every treaty and instead have non-treaty mechanisms that advance mutual assurance and trust. The above reflects two extreme positions, and we are not at the extreme that some of our European friends think we are. The reality is that some bilateral agreements (START, INF, ABMT) don't allow us to do what we want to do, and we are discussing with Russia how we can get to do those things by changing the treaties rather than trashing them. On the other hand, there are wider agreements like CFE, CTBT, LTBT, and TTBT in which we need to factor in the views of our European friends. In the case of the NPT, it is a treaty critical to nonproliferation, although some say the NPT has not really prevented proliferation, while others strongly defend that it has.

The same participant pointed out that some treaties, such as the Kellogg–Briand Pact of 1929, which renounced war as an instrument of national policy and is essentially embedded in the United Nations Charter, are definitely in the U.S. interest. In fact, 10,000 treaties are on the books, mostly with our friends, that facilitate cooperative behavior. On the other hand, there are some treaties that the United States has good reason to argue are not in our national interest. The Bush Administration is not going to trash all treaties and is trying to strike a balance. Its view is that we need to get away from long-winded negotiations that produce thousand-page treaties and annexes. It is more important to have a process for carrying out an agreement and the political will on both sides to carry out the process. And, we need to be ready to walk away from the agreement if the process is not working. However, it is not a sustainable argument to say that everything we do in the future with Russia and other nations is going to be made easier and more flexible by getting away from what we used to call arms control.

Another individual agreed that classical arms control—very carefully systemized, chronicled attempts to constrain what exists—has run its course. This does not mean that we should jettison all the treaties, many of which have utility. Rather, we should attempt to identify the kind of future we want and work toward it while, at the same time, working against the futures we don't want. A major question then for the United States is whether it can better achieve these aims by an extensive use of international agreements and international structures, or whether it is better to rely on the untrammeled free play of its power. Before September 11th, the U.S. preference was for the latter. The United States needs to re-orient and re-balance its efforts toward the former.

In response, another participant suggested that international negotiations do not necessarily work toward a happier world. Sometimes they detract. The participant further said that the reference to classical arms control having run its course refers to a bipolar world in which many treaties applied. This does not mean that more general arms control has gone away. We need to get away from resurrecting the U.S.S.R. and preventing the Russians from doing things, and concentrate on a world in which technologies have spread. The person concluded, "Arms control is too important to be left to the arms controllers."

Finally, as pointed out in the discussion on modernization, another individual suggested that there is a role for arms control agreements between the United States and Russia in getting the Russians to agree to the U.S. modernizing its infrastructure.

Multilateralism

One participant pointed out that, in the future scenarios, little was mentioned about Europe. This is an oversight, and the United States needs to consider how a less tame and pliant Europe, or even a more coherent and powerful Europe, would affect its future.

Another person responded that Americans tend to view European arguments for more multilateral participation as a call for more multilateral arms-control agreements. The view of many Americans is that multilateralism is more in Europe's interest than in America's. The participant asked whether there are reasons to believe that multilateralism could also be in America's interest.

A third person responded that it seems that in the future the world will be policed collectively or it will not be policed at all. This is a fundamental reason for the United States to see multilateralism as supporting its interests.

The first participant added that while classical arms control has probably run its course, there are other important multilateral activities, such as the response to terrorism, the response to biological weapons, and more extended use of the United Nations. These can be more effective in bringing about Dynamic Cooperation than the United States' attempting to go it alone, even though it may entail some surrender of freedom of action. In the long run, the United States needs to consider a world in which its power is no longer overwhelming and unique, and try to construct a different world that still works well even with a different balance of power.

Another individual responded that the United States already recognizes that it cannot counter world terrorism by itself, and this is borne out by its recent actions in building coalitions to combat global terrorism.

One individual addressed the issue of dispute resolution. The United States could try to exert more leverage in attempting to resolve regional disputes, as opposed to simply managing them. The United States is already trying to address the Arab–Israeli conflict. Another difficult case to which the United States might contribute is the dispute between India and Pakistan on Kashmir.

Weapons, Operations, and Infrastructure

Implications of Modernization for Proliferation

Several participants expressed concern about the implications of nuclear-weapon modernization for proliferation. One individual expressed concern that decreasing the firebreak between conventional and nuclear warfare might actually harm U.S. security and pointed out that this has important implications for developing reduced collateral damage or very-low-yield nuclear weapons. If the United States were to use such weapons in a conflict, the adversary might respond with easily acquired, less-clean 1–5-kiloton fission weapons, having little concern about their effects on non-military assets.

In response, it was agreed that if we were to use lower yield or reduced collateral damage weapons, an adversary might respond with higher yield, dirtier weapons, but that the objective of having such weapons is deterrence.

Several other participants said that modernization would have to be carefully managed. One individual said that we would have to cooperate with the other declared nuclear weapon states and be sensitive to the Article VI concerns of the non-nuclear signatories to the Treaty on the Non-proliferation of Nuclear Weapons (NPT).

One individual said that there are two schools of thought on whether we should care about the connection between nuclear modernization (as well as maintenance of nuclear weapons) and nonproliferation. Some say we do not care, and that there should be no impact on the choices regarding nuclear weapons made by the nuclear weapon states. However, others think it does matter, partly because of the legitimacy of our nonproliferation efforts and partly because of our ability to gain support from our friends. It also matters in constraining potential nuclear-weapon-state candidates who are currently non-nuclear members of the NPT and will be influenced to the extent that the world moves over the decades toward lessening the role of nuclear weapons and maybe even eliminating them.

That same individual suggested that in working the balance between modernization and NPT obligations, we would have to consider two thresholds. The first threshold is nuclear testing, and if we go above that threshold to modernize, we would pay a significant price because of the way the CTBT is psychologically linked to the NPT. Our ability to modernize and maintain a nuclear posture is also linked to whether we go down in numbers of weapons below a second threshold, and how we operationally hedge in this process will be an important consideration.

Implications of the CTBT for Modernization

One participant said that we need to distinguish the desirability of nuclear-weapon modernization from its feasibility under a CTBT. It is not possible to have serious modernization or changes under a CTBT. Accordingly, we do not want to inadvertently slip from the opinion that modernization is desirable, if indeed it is, to the conclusion that it is possible.

In response, the view was expressed that there are many in the design community who believe that some modernization can proceed without nuclear testing today. However, a study is really needed to see what can be done with and without testing, in order to look at the options and inform the decision-makers. Along with this, we should study the subsequent consequences for proliferation that were raised by several participants. Another participant pointed out how difficult a return to testing would be politically.

Modernization and the Credibility of the Deterrent

Several participants agreed that modernization is important to maintaining the credibility of our nuclear deterrent. However, one individual felt that our aging nuclear weapons serve as an effective deterrent, and that even our ancient B-52 bombers with conventional bombs have been very credible against the Taliban. The participant further said that what matters to credibility is that we are prepared to use what we have.

The point was made that plausible scenarios pose difficult operational questions on how to pick the targets and weapons, and on how to manage collateral damage. Thus, the argument for low-yield weapon options is quite relevant. On the question of whether the United States would be self-deterred if it had a low-yield weapon, the individual did not think that rogue nations and actors would discriminate much between one of our weapon options versus another. The problem is the difficult choices that face the president and the kind of options available.

In response, a number of points were raised. We need to have credible weapons to respond to WMD use against our forward deployed forces. It is unlikely that the threat of simply using more conventional

forces will be an adequate deterrent. An important question is that if deterrence were to fail and a country used WMD, was the failure caused by the lack of the right response on our part? The reality is that most targets on earth do not need a nuclear weapon, but there are some specialized targets where a nuclear weapon is the only thing that will work. Clearly, all of these issues are worthy of additional discussion and study.

Another participant replied by saying that the objective should be more than deterring nuclear-weapon use—that we should think about what we are going to do if deterrence fails. There is sometimes, but not always, a conflict between deterrence and response.

Another individual stated that as long as we have a safe and reliable stockpile, what is much more important than modernization is that we have political will and the red lines mentioned in the Policy and Diplomacy discussion of this chapter. In response, another person expressed the view that will is manifested by paying attention to it. We do not know what will be in the minds of future presidents. If the system is clearly worrying whether our weapon capabilities are up to date and we are conducting realistic operations, it is a much better sign that the will is there than if we forget about the weapons except on very rare occasions. The objective is not to use nuclear weapons, but to deter their use to the extent we can. The same individual said that after the war with Iraq, some leaders undermined the credibility of our deterrent by saying we never would have used nuclear weapons in Desert Storm, and he added that some people believe that showing a willingness to use nuclear weapons can restore the credibility of deterrence.

Hedging and Infrastructure

One participant expressed concern that we may not have enough resources behind a hedging strategy to really succeed at hedging, and that we might just provoke Russia and China enough to make matters worse than what we would like to hedge against in the first place. We need to think through what it means to have a non-adversarial relationship with Russia and China because this will affect how we hedge and how we operationally plan to do the Single Integrated Operational Plan (SIOP) and how we regularly update it.

A second participant pointed out that we currently have two design laboratories that do not design. Our infrastructure is decaying, we continually need statements from our highest-level leaders in support of the deterrent but nothing is done to sustain these statements, and we are the only nuclear power today that cannot produce a nuclear weapon.

A third person said that there is current debate whether there are ways to modernize the establishment, not necessarily to design new weapons but to modify existing weapons that already have a test base, and whether those modifications would be reliable enough for a U.S. president to use them to respond to first use by others. This area deserves a lot more study.

A fourth participant raised the possible role of arms control in maintaining a hedge. Two ways of hedging are (1) keep old weapons, and (2) modernize the infrastructure so we can build new weapons if the situation sours. Arms control can help achieve number 2, but we would need to sacrifice number 1. We would need to dismantle most of the active stockpile, but it would require a new infrastructure to allow us to do this. We might sell our need for a new infrastructure to the Russians if we reduce our stockpiles substantially. It is an interesting trade-off, even though it is a devil's bargain. In this context, it will take until 2020 just to dismantle the weapons down to the 2000 warhead level.

A fifth individual addressed the issue of activities and people at the laboratories. It is important to keep alive the capability to do problem stimulation, which can embark a lot of people on some very stimulating activities. The National Ignition Facility (NIF) is an example of this.

Another person responded that there are many opinions as to whether the Stockpile Stewardship Program (SSP) is working or not. The SSP will probably succeed. at least in the near term, but beyond 2010, there is much more uncertainty. It is not clear that in 2022 theoretical capability can be translated into reality. The NIF and other capabilities are the answers for the first few decades of the century, but are not answers for the long term. It would take many hours of discussion to address these issues.

The response was made that the science in SSP is going well. However, the production plants are not where they should be, the life-extension programs are slipping, and the programs more directly related to the weapons are not as healthy.

Exquisite Intelligence

A question was asked as to what is meant by "exquisite" intelligence, and whether a proposal was being made to reform intelligence institutions. The reply was that "exquisite" intelligence means accurately knowing the time and space coor-

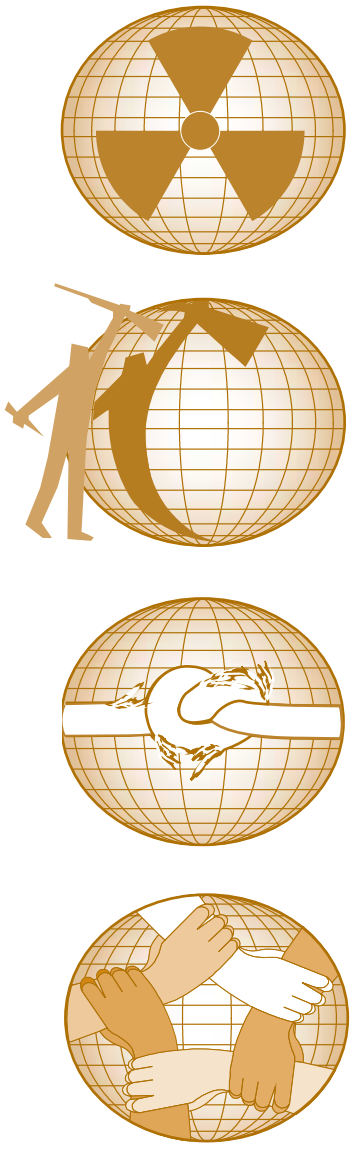
dinates of every target. There are many kinds of capabilities and collection assets that could be deployed to help achieve exquisite intelligence. What is also needed is a better understanding of what people are up to and what their motivations may be, so that capabilities and assets can be deployed in a timely fashion. A dedicated group of people that focuses on the motivations of individual regions and individual countries, as was suggested in the Policy and Diplomacy section of this report, would be very useful in this regard.

War in Cyberspace

One participant raised the issue of war in cyberspace. The World Wide Web and the Internet have altered communication, so that they are no longer conduits but a destination in their own right. The destination is called cyberspace, and it is very easy to imagine people operating entirely in cyberspace with no identifiable physical locus on the planet. The government cannot currently fight a war in cyberspace. It doesn't have the capabilities and it will need to approach it in an entirely new way.

The United States must realize that it is not only its significant military capability that gives it overwhelming and unique power. Economics and technological capability are also important, but we are no longer pre-eminent in these areas. We lost overwhelming economic power over a decade ago and we've probably already lost overwhelming power in the technical sphere. For example, some of the cyber capabilities of our military are less than what is available in a Sony play station, and companies like Infosys lead in providing business services, but are in India. And we continue to train foreign nationals in this area and then kick them out because they are here on the wrong visa. Without the technical capability and technically trained U.S. citizens, we will never win a cyber war.

Chapter 5
Recommendations for Future Study



This project raised many questions that require additional discussion and study. Many of these were identified during the course of the summary roundtable. The most relevant of these potential studies are listed below.

- Future relations with Russia and China. Defining the essential components of a non-adversarial relationship between the United States and either Russia or China, or both. Looking at these relationships in a way that makes every attempt to understand the needs, requirement, and benefits of these countries as well as those of the United States. Examining how a U.S. hedging strategy and U.S. force postures might be altered in view of these potential relationships.

- Impact of nuclear or other WMD use. How would the future be affected if an adversary were to actually use a nuclear weapon or other weapon of mass destruction? Under what circumstances might that be possible and what would be the implications for a U.S. response? How should the United States balance its posture between deterrence and response? How should the United States move swiftly to terminate a war in which biological weapons, for example, had been used, and with what possible role for nuclear weapons?

- Modernization of U.S. nuclear weapons. A study that would seek to determine what modifications and/or modernization of warheads are desirable to have a credible deterrent for future missions that cannot be met with conventional weapons. What modifications and/or modernization could be done realistically under a CTBT, and would the anticipated reliability be sufficient to warrant placing such warheads in the stockpile? What modernization of the infrastructure would be needed to achieve such reliability? A corollary would be to understand what kinds of modifications or new designs would require nuclear testing. The impact on proliferation of both of these scenarios should be included in the study.

- International norms against the use of weapons of mass destruction. What are the red lines that the international community should establish with respect to the use of WMD? How would these apply to nation states and non-state actors? What possibilities exist for response to the red lines being crossed?

- Deterring terrorists. What would it take to deter terrorists, particularly those inclined to use WMD as a means to inflict damage, rather than as a means to deter?

- Evolution of terrorism into significant regional conflict and war. How might terrorism evolve into a significant regional conflict and what might be the role of WMD in such an escalation? How can the United States seek to prevent such escalation? What are the nonproliferation issues that accompany such a scenario and how should the United States balance its posture towards allies and adversaries to limit proliferation? As a corollary, how do we keep regional war from spilling over into acts of

terrorism against the United States? What new aspects of deterrence need to be developed and exercised to prevent use of WMD in these contexts? A compelling case study is the current situation in the Middle East.

- A non-U.S.-centric future. A study that explores a future in which the United States is no longer an overwhelming and unique power. How can such a future be made to work and what is the new balance of power? How would the United States deal successfully and cooperatively with emerging power competitors, such as a more coherent and powerful Europe that is less pliant with respect to the United States, or an economically dominant China? What would Dynamic Cooperation really look like and what would we need to do to steer in that direction?

- A new look at the commitment trap, the chain reaction, and the catalytic war problems. These problems need to be revisited and thought through in light of many nations possessing the capability for WMD.

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